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ENGINEERING • PRODUCTION • MANAGEMENT

DECEMBER 1, 1950

In This Issue . . .

Variable Compression Radial Engine

Gas Turbine Powered Boat

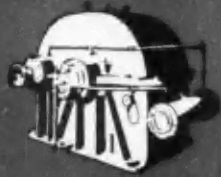
Completely Conveyorized Paint Shop

Improved Rocket Engine Crankshaft Production

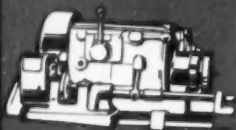
Special Body Handling Saves Storage Space

Complete Table of Contents, Page 3

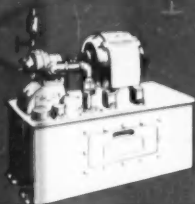
A CHILTON PUBLICATION



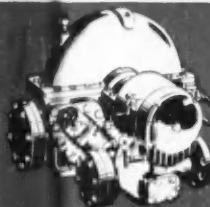
SPEED REDUCER



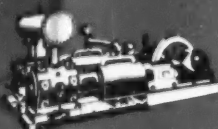
HEAD STOCK GEARS



HYDRAULIC SYSTEM



AUXILIARY TURBINE



COMPRESSOR



MOTORS

Now better than ever

NEW

**Brings two new benefits
to wide range of jobs**

For 14 years, STANOIL Industrial Oils have proved their ability to handle a wide variety of jobs in midwest plants. Now, these established products have been made better than ever! They offer these new and important savings in an even wider variety of industrial equipment.

STANOIL
TRADE MARK
Industrial Oil

1 LONGER OIL LIFE

Because they have greater oxidation stability, the new STANOILS stand up under high temperatures of operation, maintain low acidity for longer periods of service which helps keep oil systems free from deposits caused by oil oxidation.

2 GREATER PROTECTION *against RUST*

A corrosion inhibitor of the most advanced type has been added to all grades of the new STANOILS that benefit by such an additive. This inhibitor prevents corrosion trouble by "plating out" on surfaces that tend to rust. In such severe service as paper-machine and steam-turbine lubrication, new STANOILS have put an end to rust and corrosion troubles.

At the left are shown several types of equipment in which the new STANOILS can save you money and maintenance time. A Standard Oil lubrication specialist will help you find still other applications where versatile STANOILS can replace many special-purpose oils. You can reach this man quickly and easily through your local Standard Oil Company (Indiana) office. Contact him today. Or, if you wish, write: Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.



STANDARD OIL COMPANY (INDIANA)

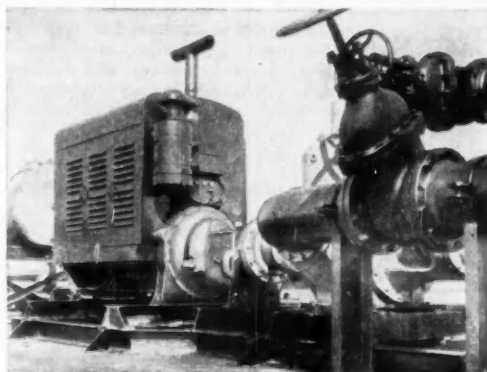
Rebuild or Repower with Cotta Reduction Units



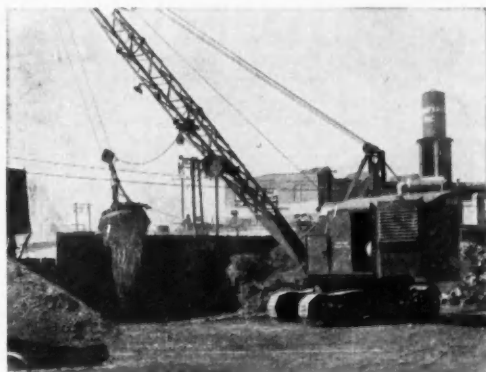
Crane converted from steam to diesel engine



Locomotive repowered with diesel engine



Gear Reduction — Pump Application



Crane repowered with modern gas engine

Cranes, Drillers, Locomotives, Shovels, Generators, Pumps — all use Cotta Heavy Duty Reduction Units to adapt output speed of new engine to meet requirements of original equipment . . . at remarkably low cost. Use Cotta, too, for transmissions custom-designed for special needs.

Send for COTTA "Engineering Data Manual" illustrating Cotta Reduction Units and Transmissions.



COTTA
HEAVY-DUTY
REDUCTION UNITS

COTTA TRANSMISSION CO., ROCKFORD, ILLINOIS



magnetic devices improved

by HIGH NICKEL ALLOYS

Reductions in size and weight of magnetic devices for all sorts of uses have been attained with high nickel alloys, and in many cases results are secured which are not attainable with other materials.

Basically, these materials are iron-nickel alloys to which other elements may be added to modify and improve magnetic or electrical properties, or to develop new properties not present in the basic iron-nickel alloy. There are essentially two types of magnetic alloys: those that are easily magnetized and demagnetized—known as magnetically soft alloys—and those that are difficult to magnetize and demagnetize—known as magnetically hard alloys or permanent magnets—and it is significant and noteworthy that the outstanding alloys of each class are nickel alloys.

80% NICKEL ALLOYS

These alloys are very soft magnetically and have extremely high initial and maximum permeabilities, low coercive force, and low hysteresis loss. Sensitive relay cores are made of these alloys because, when the winding around such a core is de-energized, the low coercive force (easy demagnetization) assures quick reliable release.

First applied in telephone loading coils to improve long distance talking and to speed up cable transmission, these high nickel alloys are now widely used to shield delicate apparatus from stray magnetic fields, and for cores in many devices such as the Magnesyn compass and airborne magnetometer, and for filters.

50% NICKEL TYPE ALLOYS

Along with high permeabilities, these alloys provide low hysteresis and eddy current losses, which are important in high frequency service. Applications include cores in quality audio and hearing aid transformers to minimize distortion, also in pulse transformers for radar, current transformers, numerous instruments and in certain portable power tools where heat is objectionable.

50% nickel-iron can be modified by special rolling and heat treating techniques to have a rectangular hysteresis loop making it useful in commutating rectifiers, magnetic amplifiers, and computer memory devices.

OTHER MAGNETIC TYPES

Special iron-nickel magnetic alloys are used where constant permeability, magnetostriction, or temperature compensation are required. They are usually employed in the form of thin strip, but also are available in powder form.

PERMANENT MAGNETS

The Alnico Family. Aptly named for the three major alloying elements which they contain...aluminum, nickel and cobalt... "Alnico" designates a group of iron-nickel-cobalt aluminum alloys that provide strong magnetic fields without application of external power. The maximum energy product of these alloys ranges from 1.6 million (Alnico I) to an amazing five and one-half million for a specially produced Alnico V.

Hard, and relatively brittle...Alnico magnets are usually cast to shape and are finished by grinding. They are not available in strip or wire form but small magnets can be produced by powder methods.

Ductile Permanent Magnet Nickel Alloys. For specific applications, the choice of a magnet alloy depends not only on its magnetic, but also on its physical and mechanical properties. *Cunife* (copper, nickel, iron) and *Cunico* (copper, nickel, cobalt) are ductile and malleable permanent magnet alloys. They can be cold rolled to wire or to strip, or punched, machined or otherwise formed by ordinary methods. In addition 18-8 stainless steel, which is normally non-magnetic, develops (when drastically cold worked) magnetic properties useful in magnetic recording.

APPLICATIONS

Permanent magnet applications are of four different types:

1. converting mechanical into electrical energy... as in a generator, dynamotor, electrical tachometer, or an aircraft magneto;
2. converting electrical into mechanical power... as in a radio loudspeaker, or in d'Arsenval meters, and less obviously in ion traps in cathode ray tubes or in arc blow-outs in switches;
3. attracting other magnetic materials... as in the magnetic chuck of a grinder, or a separator that sorts magnetic from non-magnetic materials;
4. finally, for magnetic bias, i.e., to partially saturate a magnetically soft alloy... pure nickel, for example, is usually biased in magnetostriction applications to improve performance.

NON-MAGNETIC MATERIALS

A number of non-magnetic alloys are produced having strengths as high and higher than that of structural steel. These include the austenitic stainless steels, "K" Monel, and Inconel, all containing nickel, and find wide application in electrical and electronic fields.

FULL INFORMATION

We shall be glad to furnish you with data on high nickel alloys for magnetic purposes. Send us details of your problems for our suggestions.

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK 5, N.Y.

AUTOMOTIVE INDUSTRIES

Dec. 1, 1950

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Contents

High Spots of This Issue	15
News of the Automotive Industries	17
Men in the News	25
G-E Dedicates Aircraft Gas Turbine Laboratory	32
Turning and Polishing Rocket Engine Crank Shafts. By Herbert Chase	34
Completely Conveyorized Paint Shop Operation. By Joseph Geschelin	38
Latest Equipment in King-Seely's New Plant	40
Trends in Fuels and Engine Design	42
Special Body Handling Saves Storage Space	43
Radial Engine With Variable Compression and No Master Rod. By G. S. Hoell	44
Gas Turbine Powered Boat Undergoes Tests in England	46
Productivity Up 30 Per Cent	47
Pressure-Vent Radiator Cap	47
Lapping 12 Powerglide Cases Simultaneously	48
Special Equipment for Making Huge Die Cast Grille. By Joseph Geschelin	48
Heat-Treating Setup for Smooth Flow of Materials. By Roy F. Kern	49
Milestones in Research at General Motors	50
Publication Available	52
Cost Reducing Methods Discussed by Body Engineers	53
New Production and Plant Equipment	54
New Products	60
New Mechanical Felt Standards	68
Business in Brief	70
Calendar of Coming Events	86
Advertisers' Index	112

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AUTOMOTIVE INDUSTRIES, December 1, 1950

radiators
for every
automotive
application

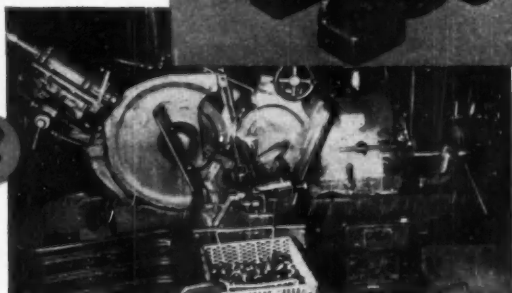
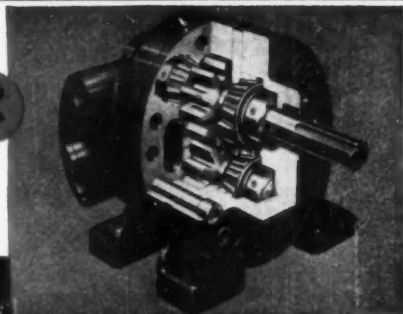
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General Offices: Dept. 100-M, Racine, Wisconsin
Plants at Racine, Wisconsin, and Matteson, Ill.

3 EXAMPLES OF SAVINGS in Hydraulic Operation



**...when rust,
sludge and
foam were
eliminated by**

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When *Texaco Regal Oils (R&O)* replaced other brands in the following hydraulic operations, this is what happened:

- 1 **Customer #1***: Saved more than \$2,000 a month in the operation of five Ingersoll process milling machines.
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- 3 **Customer #3***: Reduced hydraulic oil consumption 74% on some 80 hydraulically operated machines.

Everywhere, *Texaco Regal Oils (R&O)* assure smoother hydraulic operation, longer pump life, less machine downtime, lower maintenance costs. These turbine-grade oils are specially inhibited and processed to eliminate rust, sludge and foam. They *keep systems clean!*

Let a Texaco Lubrication Engineer help you gain similar cost-saving results in *your* plant. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

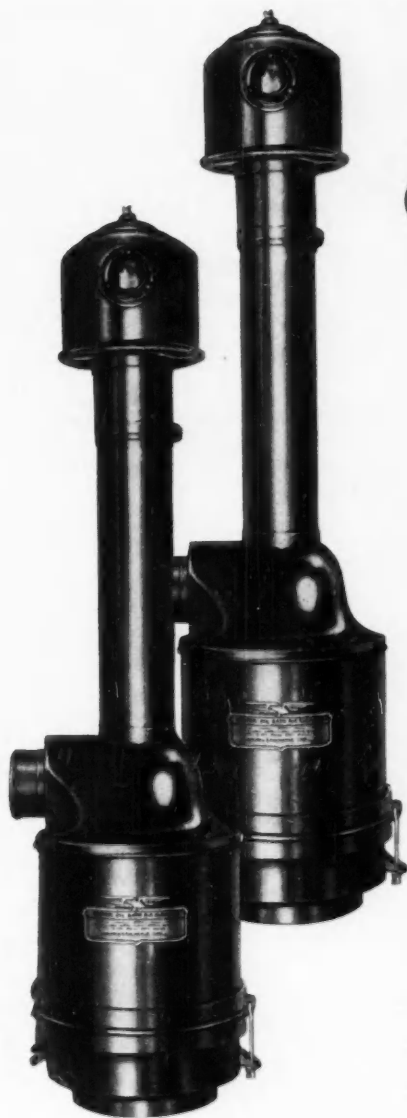
*Name on request



TEXACO Regal Oils (R&O)

FOR ALL HYDRAULIC UNITS

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night, METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

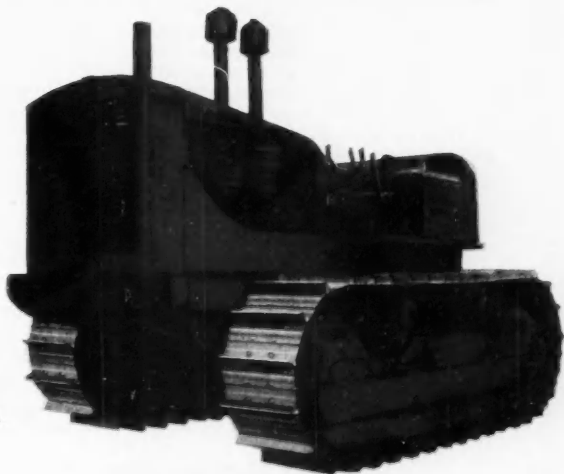


Again it's **UNITED Air Cleaner**

FOR NEW ALLIS-CHALMERS TRACTOR

It's United protection again—this time for the new Allis-Chalmers HD-20. This "biggest of all" crawlers is equipped with twin United Oil Bath Air Cleaners, assuring clean, dust-free air for the tractor's powerful 2-cycle diesel engine. The protection furnished by United Cleaners adds hundreds of hours to the life of rings, bearings, sleeves, pistons.

Whether it's the huge HD-20 or a small portable power unit, United has an air cleaner — or can build one — to fill the bill. We invite your inquiry.



Here is the new Allis-Chalmers HD-20. It is equipped with Model CT12-D16920 United Oil Bath Air Cleaners and C-16925 Precleaners, as illustrated.

UNITED SPECIALTIES COMPANY

UNITED AIR CLEANER DIVISION, CHICAGO 28 • MITCHELL DIVISION, PHILADELPHIA 36

★ **AIR CLEANERS** ★ **METAL STAMPINGS** ★ **DOVETAILS** ★
★ **IGNITION AND TURN SIGNAL SWITCHES** ★ **ROLLED SHAPES**

Now **TWA** Offers **All-Cargo "Sky Merchant" Service** **Coast to Coast**



Speed your automotive-product shipments direct at low cost between major U. S. cities

Practically anything you want to ship . . . and to almost anywhere you want to ship it . . . can now go faster, more economically and more easily via TWA's new fleet of giant, 4-engine *All-Cargo* planes . . . TWA "Sky Merchants."

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Results of this and other tests prove that you can count on Exide Diesel Cranking Batteries for:

- high maintained voltage—a *quick breakaway* and *high cranking speeds*.
- long life—low depreciation, less frequent replacements.
- low costs—operating, maintenance, repair.
- ruggedness for heavy-duty service in all climates.

Get top performance, long battery life and economy with Exide Batteries. Use them for all your Diesel cranking—buses, trucks, trailer-tractors, off-the-highway equipment, ships, power plants, Diesel-electric locomotives.

LET EXIDE'S ENGINEERING STAFF, the largest in the industry, help you find the right answer to any Diesel cranking problem.

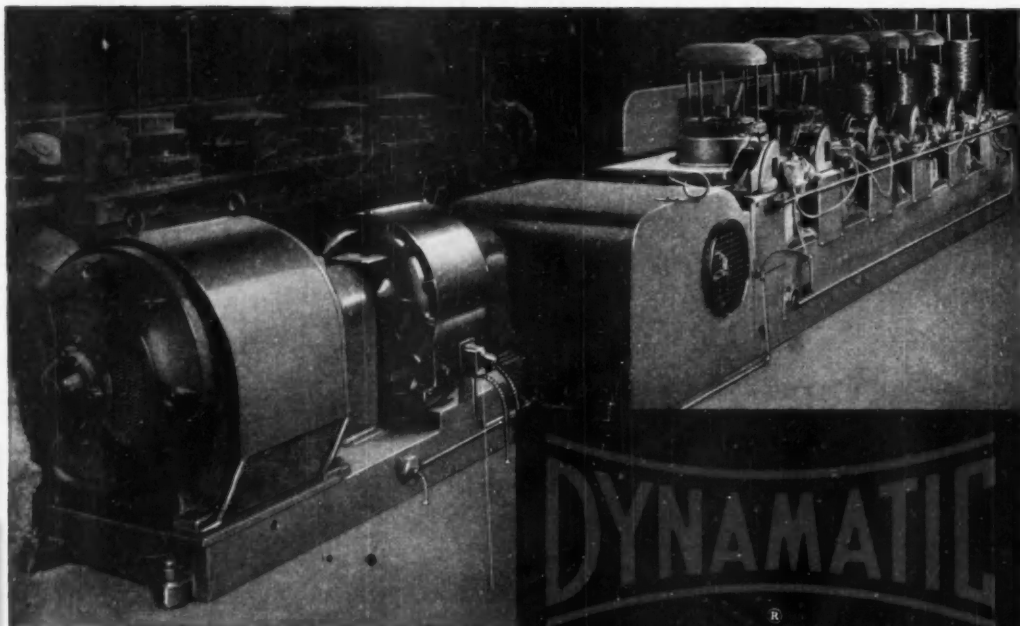


THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 32

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Model 7W Dynamatic Water-Cooled Coupling driving a wire machine which draws $\frac{1}{32}$ " wire to .070" in six dies. Power is derived from a 200 HP, 1200 RPM induction motor.

DYNAMATIC WATER-COOLED POWER COUPLINGS

Adjustable Speed Drives for Industrial Use

Dynamatic Water-Cooled Couplings provide adjustable speed drive direct from an AC power source for a wide range of industrial applications. They transmit rotation from a driving to a driven member without mechanical contact with stepless adjustable control and almost instantaneous response. A simple method of providing adjustable speed from a constant speed source (or vice-versa) with full torque starts.

Effective water-in-the-gap cooling permits large capacity in small space; design provides complete protection against atmospheric impurities.

Standard sizes are available for transmitting torques of 50 pounds feet to approximately 5,000 pounds feet. Units up to 200,000 pounds feet or larger can be built to order.

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INSTANTANEOUS RESPONSE

ACCURATE SPEED CONTROL

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SMOOTH TORQUE TRANSMISSION

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... faster, easier driving with
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assure tool and die makers of standard
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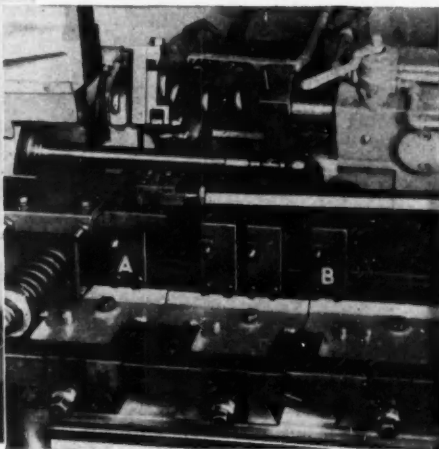
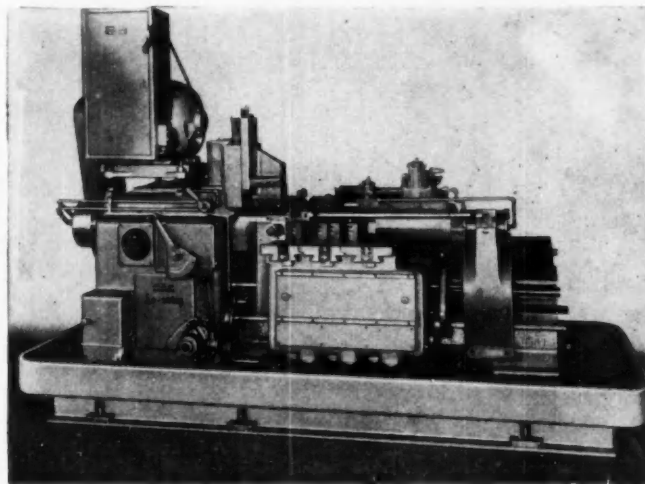
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MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



MODEL "AR" Lo-swing SLASHES COSTS ON MAIN DRIVE SHAFT

Problem: To offset high labor costs by increased production on Main Drive Shaft.

Solution: The Model "AR" Automatic Lo-swing Lathe was selected for this job because it had sufficient weight and rigidity to insure long tool life at high cutting speeds with sintered carbide tools.

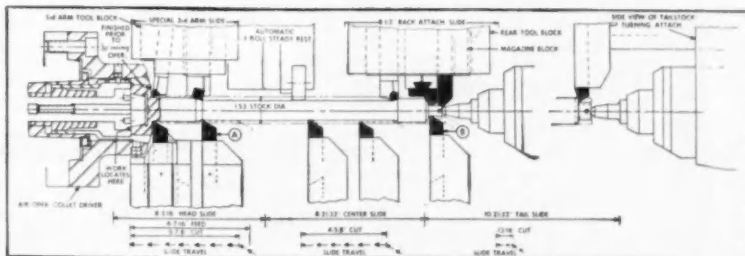
Shafts are delivered to the Lathe with the gear end finished to size and the small end centered. The line drawing shows a cross section of the collet chuck which centers and drives the shaft on the gear end. This method of driving increased the rigidity of the shaft. The three-roll steady rest is automatically operated, the rolls being advanced to contact the shaft as soon as tool "A" turns a spotting wide enough to clear the rolls. Tool "A" is the only tool cutting until the steady rest rolls support the piece, after which all the other tools start cutting simultaneously.

Another feature on this machine is the Automatic Tailstock Turn-

ing Attachment, shown in the close-up illustration, which is used to rough turn the small end of the shaft ahead of tool "B" which finish turns. This small diameter is held within close limits by this method and a green grind operation is eliminated.

The complete cycle is automatic; the operator simply loads and unloads the parts and pushes the starting button. All tools are carbide. Material is SAE 5140 steel forging and the machine cycle time is 30 seconds.

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Another Transfer-matic by Cross

**Drills, Mills
and Taps**
Automatic
**Transmission
Cases**

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- ★ 86 pieces per hour at 100% efficiency.
 - ★ 104 operations.
 - ★ 54 stations—1 loading; 6 milling; 23 drilling, reaming, and counterboring; 2 tapping; 21 inspection; 1 unloading.
 - ★ Cross Machine Control Unit with "Toolometer" automatically stops machine when any tool requires changing; pre-set tools reduce down time.
 - ★ Other features—hardened and ground ways, hydraulic feeds, automatic chip conveyors, standard unit construction.

Established 1898

THE **CROSS** CO.
DETROIT 7, MICHIGAN
Special MACHINE TOOLS



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OUT OF THE BOOK....**

**... and
still get
"something
special"**

Yes...you may select your required taps from a complete line of Hanson-Whitney *standard* styles and sizes and still get "something special."

And by "special" we do not mean extra-cost, made to specification taps. We mean standard extra quality "finished" taps...ground after hardening to give you the keenest cutting edges, the highest accuracy in lead, angle and diameter. All customary sizes in Hand Taps, Machine Screw, Nut, Tapper, National Hook, Pulley, and Pipe Taps are stocked for fast shipment in protective, clear-labeled, cartoned boxes. For maximum tap life and maintained accuracy, specify H-W.

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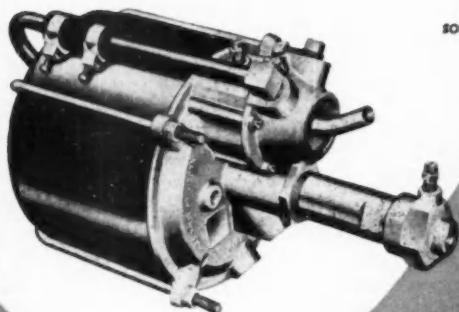
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THE POWER BRAKE PREFERRED ABOVE ALL OTHERS!

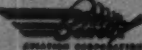
More than two million installations are certainly undeniable proof of any product's popularity. In the field of power braking it means that one—the Bendix Hydrovac—is preferred above all others. Such overwhelming acceptance by the men who service, drive and own the nation's trucks is impressive enough in itself. It further

suggests, however, that Hydrovac* power braking might very profitably be included as original equipment by most manufacturers. If you are interested in taking advantage of this great pre-sold market, write the factory direct for details on Hydrovac—the undisputed leader in power braking.

*REG. U.S. PAT. OFF.



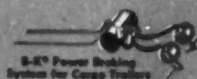
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**Commercial
Emergency
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**8-87 Power Braking
System for Cargo Trailers**



**Bendix Hydraulic
Power Steering**

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OF THE BASICS
OF BETTER
MOTOR VEHICLES



**Bendix Automatic
Clutch and Gear Shift
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AUTOMOTIVE INDUSTRIES

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**AUTOMOTIVE
INDUSTRIES**

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High Spots of This Issue

★ Turning and Polishing Rocket Engine Crankshafts

What is believed to be the first production job using carbide tools for intermittent cuts on crankshaft forgings is incorporated in the automatic lathe setup at Oldsmobile's Lansing, Mich., plant. Polishing of all crankshaft journals, crankpins, and oil seal diameters is now done on a new machine developed by Oldsmobile personnel. Details start on page 34.

★ Completely Conveyorized Paint Shop Operation

At the new DeSoto body plant, paint shop operation is automatic in cycle from start to finish by means of a system of electronically synchronized conveyors. Fifteen different colors are scheduled, including two-tone treatment. Photos, diagrams, and descriptions begin on page 38.

★ King-Seeley's Latest Equipment

The new Scio plant at Ann Arbor, Mich., is set up for production of governors, assembly of instrument panels and speedometers, and other specialties. Here are described plant facilities for zinc die casting, electroplating, painting, and kindred automotive departments. Page 40.

★ Special Body Handling at Studebaker

Studebaker is storing passenger car bodies vertically instead of horizontally. This has effected large savings for additional storage space. Here is told the interesting story of how special-purpose trucks maneuver bodies in and out of this vertical storage on assembly line schedules timed to seconds. Page 43.

★ Radial Engine With Variable Compression

A way has been found to vary compression in cylinders of airplane engines at will of the pilot. This steps up productive rate of the fuel being consumed. It substitutes an ingenious system of disks in discarding generally accepted systems of master connecting rods. Be sure to see page 44.

★ 23 New Product Items And Other High Spots, Such As:

G-E dedication of their aircraft gas turbine laboratory; cost reducing methods discussed by body engineers; a pressure-vent radiator cap; lapping 12 Powerglide cases simultaneously; special equipment for making huge die cast grille; a heat-treating setup for smooth flow of materials; milestones in research at General Motors; and trends in fuels and engine design.

*News of the Automotive Industries, Page 17
For Complete Table of Contents, See Page 3*

Relief for Shops . . .

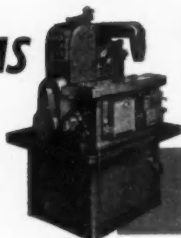
ABOUT TO BURST THEIR PRODUCTION SEAMS

Worried about growing pains? Perhaps a better way to increase production would be with the aid of new, faster machine tools. One thing's for sure—if you're concerned with milling operations on large quantities of small parts, you can produce them faster and at lower cost on CINCINNATI No. 0-8 Milling Machines. And you may probably gain an extra advantage of smaller floor space—the 0-8's require very little, and they can readily be integrated with conveyors. ¶ You have a choice of four CINCINNATI No. 0-8 Milling Machines:

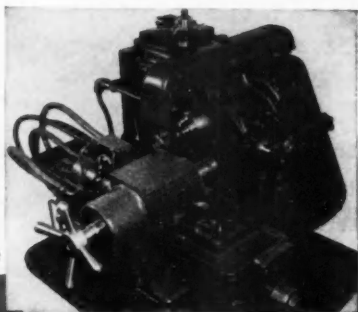
- 1) No. 0-8 Plain Automatic
- 2) No. 0-8 Automatic Rise and Fall
- 3) No. 0-8 Vertical, longitudinal table feed
- 4) No. 0-8 Vertical, rotary table feed

A few examples of the type of work handled by these efficient, hard working machines are illustrated here. Do they give you ideas? Complete data about CINCINNATI No. 0-8 Millers may be obtained by writing for the literature indicated in the captions.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO



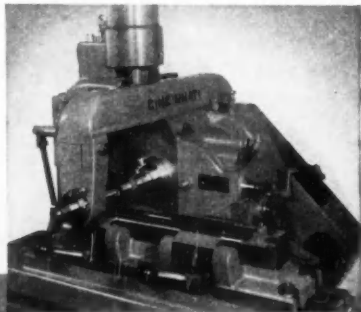
CINCINNATI No. 0-8 Plain Automatic Miller. Catalog No. M-1607.



CINCINNATI No. 0-8 Automatic Milling Machine with hydraulic rotary milling fixture to form mill grooves on the O.D. of two sizes of saw shanks. Production . . . 175 per hour.



CINCINNATI No. 0-8 Automatic Rise and Fall Milling Machine. Catalog No. M-1607.



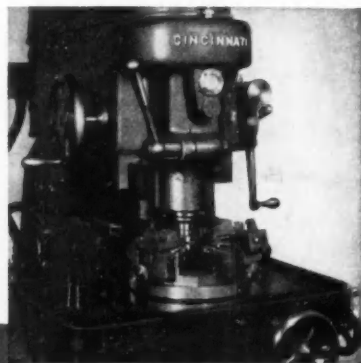
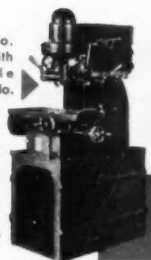
Jumping the cutter over obstacles or taking two or more aligned cuts are specialties of CINCINNATI No. 0-8 Rise and Fall Automatics. In this example two keyways are milled in one cycle. Production . . . 101 per hour.



A high speed carbide milling operation on a CINCINNATI No. 0-8 Vertical, milling the bottom of an aluminum brake shoe support. Production . . . 120 per hour.

CINCINNATI No. 0-8 Vertical with conventional table feed. Catalog No. M-1532-1.

CINCINNATI No. 0-8 Vertical with Rotary Table Feed. Catalog No. M-1199-2.



CINCINNATI No. 0-8 Vertical with Rotary Table tooling up for an unusually high production job of milling bevels on the end of firing pins. Production . . . 530 per hour.



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MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



News of the AUTOMOTIVE INDUSTRIES

Vol. 103, No. 11

December 1, 1950

September Registrations 2nd Best in History

The final figures on September registrations of new passenger cars showed a total of 627,755 units, the second best month in history, according to R. L. Polk & Co. Earlier reports had indicated that September would fall about 100,000 units short of the all-time record of 683,995 established in August. Truck registrations for September were the third best in history totaling 113,750 units. Total truck registrations this year are running about 100,000 ahead of the same period last year.

All 1951 Models to be Announced by Feb. 1

By the end of January all automobile manufacturers will have announced their 1951 models. Chevrolet, Pontiac, and Cadillac will announce new models this month with Buick and Oldsmobile coming in January, along with all four Chrysler divisions.

1951 Fords Have New Fordomatic Drive

The 1951 Fords (see cut on this page), with Fordomatic Drive, which is optional at extra cost, will make available

a choice of three transmissions and two engines, see description of automatic transmission, page 38, June 15th AUTOMOTIVE INDUSTRIES. Both the conventional three-speed transmission and the Ford overdrive will continue to be available, and these, with the new Fordomatic Drive, will be offered with either the 100-hp V8 or the improved 95-hp six engines.

The chassis frame for the 1951 models

has been strengthened by extending heavy box section side rails almost to the rear end. The car has a wheelbase of 114 in. Among engine changes valve rotators have been incorporated; the top compression ring on each piston in V8 and six engines is now chrome flashed; and weather-proof ignition system is also a feature. Key starting is provided by the new ignition switch which incorporates the starter control. New mounting of the intake manifold on the Six is said to give more uniform fuel distribution for quicker cold weather starting and smoother performance. Expansion control Autothermic pistons have been installed, and a re-designed camshaft and a three-blade fan has been adopted.

Another feature of the new cars is a softer ride made possible by suspension improvements and automatic ride controls. A new control valve was developed in the hydraulic shock absorbers, which adjusts the cushioning effect.

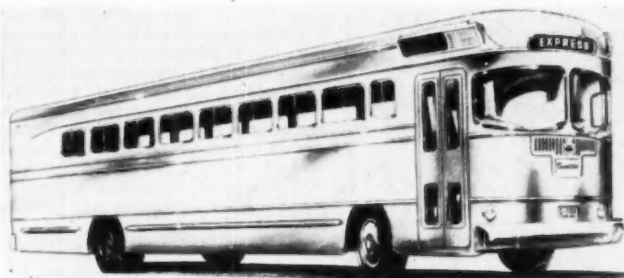
K-F Working on New Engine for Kaiser

Reports from machine tool sources indicate that Kaiser-Frazer has ordered some initial tooling for a new engine. It is understood to be an overhead-valve, in-line six designed for eventual compression ratios up to 12 to 1. It is understood that the engine will be used for the Kaiser line only and would be avail-



FORD FOR FIFTY-ONE

Featuring Fordomatic Drive, the 1951 Ford Custom Fordor sedan has styling refinements. The new models have a dual spinner radiator grille, longer wrap-around bumpers, and new ornamentation. Parking lights are restyled and larger chrome headlamp rims extend beyond the lenses.



CONVERTIBLE COMBINATION

The Twin Coach Co., Kent, O., has announced this new type of motor vehicle which may be operated as either passenger bus or cargo truck or as a combination bus-truck. Known as the Twin Coach Convertible, it is 35 ft long overall, and is said to provide comfortable seating for 37 passengers; in addition, it has 321 cu ft of cargo space. Convertibles are powered by Fageol Twin Coach six-cyl engines rated at 162 to 250 bhp for various models.

News of the AUTOMOTIVE

able for the 1952 model to be announced next fall.

New Light Weight Engine Shown in Detroit

A light weight horizontally-opposed engine said to have distinctive design features of patentable character was shown in Detroit recently by Stanley M. Hallam. Details of design features are being withheld pending the formation of a company to handle the manufacture and marketing of this engine on a commercial basis.

K-F to Offer Deck Lid on Henry J

Kaiser-Frazer has completed preliminary work for making a rear deck lid available as optional equipment on the Henry J at extra cost. Buyers will soon be able to have window ventilators and mechanism for raising and lowering the rear windows installed as optional equipment.

Reports Show Credit Curbs Not Too Bad

It is still very difficult to assay accurately the effect of the 15-month credit curb on automobile sales. Dealers are still protesting vehemently and have enlisted the aid of some members of Congress in an effort to get the restriction eased. They claim that sales are off drastically, as much as 50 per cent in some cases. On the other hand, scattered



MUNTZ SPEEDSTER

Said to have been tested on the salt flats in Utah at 142 mph, this Muntz automobile, priced at \$5500, is to be assembled in Chicago, according to Earl W. Muntz, president, Muntz TV, Inc. Weighing about 2600 lb, the car has an aluminum body, 160-hp Cadillac engine, and Hydra-Matic transmission.

reports of retail sales issued by manufacturers do not bear out that contention. The reports show in some cases that sales during October were off from the high level of September, but not seriously. A few examples to show the decline in October from September are: Buick, 16 per cent; Pontiac, less than 10 per cent; and Oldsmobile, about 11 per cent. In all cases, however, sales were up from 10 to 20 per cent over October a year ago. Mercury October sales, on the other hand, were four per cent higher than in September and 21

per cent above October, 1949. During the third 10-day period in October during which the 15 months' limitation was in full effect, sales were actually higher than in previous 10 days.

There appears to be a wide diversion of opinion throughout the country as to the effect of tighter regulations. Large metropolitan areas are apparently harder hit with some of the smaller outlying areas still clamoring for automobiles. The result has been a reshuffling of factory allocations to accommodate demand from areas where it is still strong. Even in the large city areas, sales have recovered somewhat from the initial slump which followed the tightening of credit, and sales have picked up under more aggressive selling, aided by some discounting and more liberal trade-in allowances. There is no doubt that demand has been affected but the extent to which it has reduced sales is still debatable. In view of parts shortages and actual or impending curtailments in certain vital materials, however, there is a growing belief that the tighter credit restrictions, if they remain in force, may not be the major problem next year because of a strong possibility that automobile production may be reduced as much as 15 to 25 per cent.

1950 NEW PASSENGER CAR REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Nine Months' Total

MAKE	NINE MONTHS						Per Cent of Total	
	Units						1950	1949
	September 1950	August 1950	September 1950	1950	1949			
Chevrolet	137,662	147,369	108,320	1,080,051	762,896	22.74	21.50	
Ford	110,211	113,067	72,537	897,843	689,901	18.90	18.04	
Buick	50,180	55,466	37,964	405,143	284,210	8.53	8.01	
Plymouth	73,034	71,740	50,002	364,653	379,611	7.68	10.70	
Pontiac	41,654	45,786	30,996	336,270	236,553	7.08	6.67	
Oldsmobile	34,135	37,801	25,130	281,358	198,952	5.92	5.61	
Mercury	28,030	29,371	16,866	242,866	126,776	5.11	3.63	
Studebaker	25,791	26,026	19,671	223,023	143,567	4.69	4.05	
Dodge	37,403	43,708	29,011	212,473	192,090	4.47	5.41	
Nash	9,722	16,147	8,843	137,719	101,967	2.90	2.87	
Hudson	9,868	15,435	9,640	113,904	110,589	2.40	3.12	
Chrysler	16,665	20,641	12,081	102,885	94,741	2.17	2.67	
De Soto	12,482	15,631	9,249	77,483	74,742	1.83	2.11	
Cadillac	12,394	12,568	6,882	72,806	60,948	1.53	1.72	
Kaiser	13,298	14,507	4,475	65,596	49,538	1.38	1.37	
Packard	3,515	3,836	8,735	52,330	70,309	1.10	2.15	
Willys	3,375	4,668	2,801	27,429	22,372	.58	.63	
Lincoln	2,853	3,570	3,036	25,919	26,825	.55	.81	
Frazer	1,475	1,106	720	11,209	14,295	.24	.40	
Crosley	624	849	678	5,431	6,373	.11	.24	
British Austin	427	656	221	4,533	2,266	.10	.06	
British Ford	269	262	242	1,273	4,705	.03	.13	
Miscel. Domestic	419	386	25	1,226	1,469	.03	.04	
Miscel. Foreign	1,281	1,369	322	6,203	2,513	.13	.06	
Total—All Makes	625,750	683,995	459,647	4,749,613	3,548,296	100.00	100.00	

* Data from R. L. Polk & Co.

Libbey-Owens-Ford Develops New Shaded Windshield

Approved by 44 states (excluding Massachusetts, California, Kansas and Delaware) and the District of Columbia, a new automobile windshield scientifically developed to reduce road glare

INDUSTRIES

and heat and consisting of slightly tinted bluish-green safety plate glass with graduated shading above the eye level, has been developed by the Libbey-Owens-Ford Glass Co. Called the Shaded Windshield it is offered on Buick automobiles as optional equipment at extra cost, and it is expected that 50 per cent of 1951 Buicks will be ordered with it. It has passed light-transmission requirements of the American Standards Association with a good margin to spare, according to G. P. MacNichol, Jr., vice-president, Libbey-Owens-Ford.

Lincoln Prices Unchanged as Ford Holds Line

As had been expected, prices of 1951 Lincoln and Lincoln Cosmopolitan cars

quarters for the Foundation will be in New York City. The Ford Foundation was founded 14 years ago, and present assets are estimated at about \$238 million. It is a non-profit organization devoted to advancement of educational, cultural and philanthropic projects.

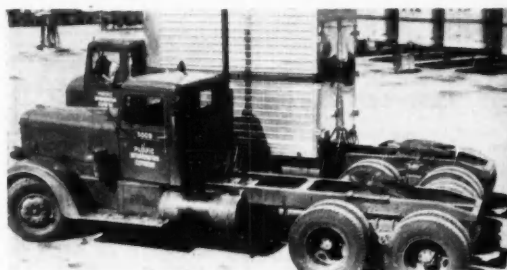
Canada's Vehicle Output Over 290,000 in Nine Months

Canadian motor vehicle plants shipped out 294,203 units in the nine months ended Sept. 30, compared with 216,867 in the corresponding period of last year, the Bureau of Statistics reported. Shipments in September alone totaled 38,035 units, compared with 24,272 in August, and 30,894 in September, 1949.

New Locomotive Lubrication Data at SAE Diesel Meeting

At the SAE National Diesel Engine Meeting held in Chicago recently, technical papers presented revealed the results of exhaustive tests in locomotive lubrication and possibilities of making extensive gains in operating efficiency. The tests, covering hundreds of thousands of miles, are said to have produced data useful to all operators of heavy-duty Diesel engines, including U. S. Navy installations. The meeting was sponsored by the Diesel Engine Activity of the Society of Automotive Engineers with the cooperation of the SAE Chicago Section.

The SAE has chosen Sidney J. Williams, assistant to the president of the



Developed by Pacific Intermountain Express, this new type combination carries as much as 2200 lb of extra freight in a 664 cu ft compartment set on the tractor itself. The new cab over



COMPARTMENT FOR CARGO

engine unit permits installation of this 12 by 8 by 8 1/2 ft aluminum box aft of the cab and forward of the fifth wheel. The box conforms in height and width with the trailer body.

remain unchanged from those prevailing on 1950 models. The company thus continues its "hold the line" policy established when the 1951 Mercury line was introduced in late October. The General belief in the industry now is that when GM 1951 models are announced starting early in December, prices will remain unchanged or increased only very slightly. It is problematical, however, whether with costs continuing to climb and with the strong possibility that volume may be reduced because of materials shortages, new car prices can be held at current level very long.

Hoffman Takes Presidency of Ford Foundation

Paul G. Hoffman, former president of the Studebaker Corp. and more recently head of ECA, has officially accepted appointment as the first president of the Ford Foundation. His salary will be \$75,000 a year. Head-

AMA Advises Makers to Adopt Turn Signals

Although no official action has been taken by the automobile industry to install directional signal equipment at the factory on all new cars, the AMA on advice of its engineering advisory committee has notified manufacturers that they would be well advised to make plans now for such installation at some time in the future. Specifications for turn signal equipment have been revised and brought up-to-date by the SAE lighting committee. In its report to members, AMA stated that turn signals are a reasonable and practical device. Such equipment has been required by law in Minnesota for about a year and must be installed on all new cars sold in New York State after Jan. 1, 1952. It is believed that other states will eventually require turn signal installations if they are not adopted first by the industry. That move may be delayed, however, by curtailment of materials.

National Safety Council, as the Fourth David Beecroft Memorial Lecturer for his "substantial contributions to the safety of traffic involving motor vehicles." Mr. Williams joined the National Safety Council staff as chief engineer in 1918, was made director of the public safety division in 1924, general manager in 1944, and rose to his present position a year later.

Equal Standing for U.S.-Canada Priority Ratings

Priority ratings for defense orders issued either by the United States or Canada will henceforth have equal standing in either country. This was made official by the issuance of NPA Reg. 3 which extends ratings to Canadian firms producing defense orders for the United States. At the same time, Canada guaranteed the same priority assistance to this nation under the mutual economic and defense agreement between the two countries.

News of the AUTOMOTIVE

Vehicle Production Continues High

Despite production difficulties that are mounting daily, automobile manufacturers are continuing to go full steam ahead in producing all of the cars and trucks that they possibly can get materials for. Official figures on November production are not yet in, but it is expected that passenger car output fell considerably below 600,000 units, a sharp drop from the 660,000 turned out in October. Model changes by Ford and some GM divisions contributed to the decline, as well as a shortage of materials and parts. Nash was down for more than a week because of a strike at a supplier plant and Ford also lost several days production because of a shortage of steel and other parts. An important factor in the Ford steel short-

freeze. In World War II no such provisions existed making it a relatively easy matter to freeze wages at a specified level. With a large segment of the automobile industry now using a system of gearing wages to the cost-of-living, the government might run into difficulty attempting to peg wages if the BLS index did not hold level.

International Harvester Adopts GM Wage Plan

The International Harvester Co. has reached an agreement with the UAW-CIO after a 10-week strike and more than 16 weeks of negotiations. The new five-year master contract embraces the cost-of-living and annual improvement factor features pioneered by GM in 1948 and now used by six automobile companies. It also provides an immediate increase of 10 cents an hour consisting of

six cents an hour as a cost-of-living factor to cover higher living costs up to July 15 and four cents improvement factor. In addition, a further increase was given Dec. 1 in line with the higher BLS Index. It is estimated that production of about 25,000 trucks was lost because of the strike.

Michigan Abrasive Co. Holds Open House at New Plant

The formal opening of the new home of the Michigan Abrasive Co., manufacturer of a complete line of coated abrasives, at 11900 East Eight Mile Road, Detroit, was celebrated with an open house recently. Until the new plant is completely equipped, operations will continue at the old plant, and gradually be transferred to the new plant.

REGIONAL SALES OF NEW PASSENGER CARS

Zone	Region	September				Per Cent Change	
		1950	1949	1948	1947	Sept. over Aug.	Sept. over Sept. 1949
1	New England	32,530	32,902	27,421	268,509	-1.31	+18.63
2	Middle Atlantic	109,887	124,784	84,478	889,441	-11.94	+30.08
3	South Atlantic	67,340	77,073	52,623	556,876	-12.63	+27.97
4	East North Central	154,227	173,348	117,184	1,170,372	-11.03	+31.80
5	East South Central	28,362	29,799	19,716	238,937	-14.82	+28.74
6	West North Central	69,463	64,485	48,182	486,988	+7.72	+44.14
7	West South Central	63,568	77,157	41,689	452,283	-17.59	+52.53
8	Mountain	19,726	24,493	16,041	167,988	-19.42	+23.04
9	Pacific	63,602	79,897	52,295	510,040	+4.64	+59.87
Total—United States		629,758	683,995	459,647	4,749,613	-8.92	+38.14

States comprising the various regions are: Zone 1: Conn., Me., Mass., N. H., R. I., Vt.; Zone 2: N. J., N. Y., Pa.; Zone 3: Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va.; Zone 4: Ill., Ind., Mich., Ohio, Wis.; Zone 5: Ala., Ky., Miss., Tenn.; Zone 6: Iowa, Kan., Minn., Mo., Neb., N. D., S. D.; Zone 7: Ark., La., Okla., Tex.; Zone 8: Ariz., Colo., Id., Mont., Nev., N. Mex., Utah, Wyo.; Zone 9: Cal., Ore., Wash.

age has been the slowdown by employees in the steel mill protesting an empire's ruling eliminating premium pay for Saturday and Sunday work within the regular 40-hour week. Nonetheless, despite all the handicaps, production this year will not be far short of eight million cars and trucks.

Living Cost Rise Hikes Automotive Wage Rates

Wage increases of two cents an hour to employees in the automobile industry under cost-of-living index contracts have pushed manufacturing costs upward another notch. It is estimated that more than 500,000 UAW-CIO employees are covered by the cost-of-living clauses, pioneered by GM in 1948. Other companies now using the plan include Ford, Packard, Kaiser-Frazer, Nash, Studebaker, Bendix Corp. and Kelsey-Hayes. Use of the cost-of-living index poses a thorny problem for the government in the event of a wage price

North American Aviation Expands Buildings

A new million dollar building program adjacent to the company's Los Angeles plant was announced by North American Aviation. Manufacturing and warehousing buildings totaling 238,000 sq ft under roof will be constructed on property immediately south of the present warehouse building. Two buildings will be for manufacturing operations.

Gasoline Octane Rating Maintains High Level

Latest information indicates that the octane rating of gasoline has not been lowered as was expected and may not be in the near future. It is still expected, however, that a greater need for aviation gasoline next year may lead to an eventual reduction in octane rating of gasoline for civilian use.

AMA Committee Working with Defense Agencies

There has been no serious discussion yet about reactivation of the Automotive Council for war production which functioned so well during World War II. The Council, or something similar, undoubtedly would be reestablished again in case of a serious emergency such as an all-out war, but at present liaison between automobile manufacturers and military agencies is carried on through AMA's Committee on National Defense Cooperation which was formed two years ago. This committee has been cooperating with the munitions board reviewing plans for survey and assignment of facilities and in conferring with the board on procurement regulations. It also has worked out a parts numbering and control procedure at the request of Army Ordnance and has developed a program of training specialists in packaging.

INDUSTRIES

Buick Cleans Forgings by Shot Blasting

As part of its water pollution control program, Buick has turned to shot blasting for cleaning forgings in its Flint operation. The shot blasting machine currently used to clean small forgings has cut the amount of sulphuric acid used by 90 per cent. A machine for cleaning larger forgings has been ordered and use of sulphuric acid for cleaning is expected to be discontinued entirely by the end of next year.

Borg-Warner Earnings Set New Record

The Borg-Warner Corp. has announced that net earnings for the first nine months of this year were more than \$23.7 million, the highest on record for any similar period. Earnings for the same period in 1949 amounted to \$15.1 million. Net sales for the first nine months of this year totaled more than \$243.7 million, compared with \$212.3 million for the same period a year ago.

General Tire Develops New Rubber Making Process

General Tire & Rubber Co. has offered the government a new process for increasing synthetic rubber production by 22 per cent without any increase in the amount of raw materials consumed. The company has not revealed any details



SHORT AND LIGHT

The new lightweight Ward LaFrance "W" Series Tractor, has a wheelbase of 144-in. This model is available with either gasoline or Diesel engines up to 200 hp., and this series of tractor-truck uses transmission and axle combinations to meet particular gross weight requirements.

of its method, but says that it would eliminate or at least reduce the need for increasing the size of synthetic and butadiene plants, in addition to bringing down the price of natural rubber. The company also says that rubber produced by the new method is superior to GR-S synthetic rubber. General is asking the government for compensation for de-

velopment costs and technical information acquired in developing the new process.

Car Dealers Put Under NLRB Jurisdiction

The NLRB has ruled that it has jurisdiction over labor cases involving franchised automobile dealers. Basis for the board's ruling is that automobile dealerships are an integral part of an interstate enterprise even though the business is owned locally and makes all its sales within the borders of a single state. The ruling came out of a case in which the International Association of Machinists charged unfair labor practices against a Fowler, Calif., dealer.

New K-F Stamping Plant to Cost \$3 Million

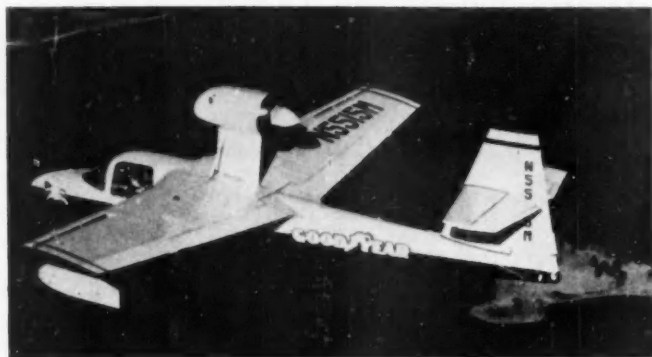
Kaiser-Frazer will put about \$3 million into its new stamping plant at Shadyside, O., scheduled to go into production next May. Construction, cranes, shipping facilities and installation of equipment will account for about \$1.7 million, with the remaining \$1.3 million going for presses and machinery. Equipment will include 13 large presses, from 300 to 750-ton capacity, two 180 in. blanking presses, six 75-ton presses, and three large cranes. Other equipment will include rolling machines, shears, shapers and similar machinery.



NEW IN FRONT

This new 1951 Crosley Super Station Wagon is one of the new 1951 Crosley models which have newly-designed front ends, 7.8 to 1 compression ratio engines, nine-inch Bendix hydraulic brakes, and new strut-type hydraulic shock absorbers. A business coupe has been added to the Crosley passenger car line, and prices on the 1951 models range from \$898 to \$1046, delivered at Marion, Ind. Federal tax and handling included.

News of the AUTOMOTIVE



DEVELOPED FROM THREE

This new model GA-22 experimental four-place amphibian is being demonstrated by Goodyear Aircraft Corp. before government observers representing the armed services. It is an all-metal flying boat type amphibian with a single 186-hp engine mounted in a pusher nacelle above the hull, and was developed from the earlier three-place GA-2.

Midland Steel Buys Last of Hupp Buildings

In order to obtain additional facilities for possible military contracts, Midland Steel Products Co. has bought the remaining buildings and land of the Hupp Corp. in Detroit. Included in the purchase are a four-story factory building, an office building, a garage and five acres of land. The property is adjacent to the present Midland plant. Midland has thus acquired about 280,000 sq ft of additional manufacturing space.

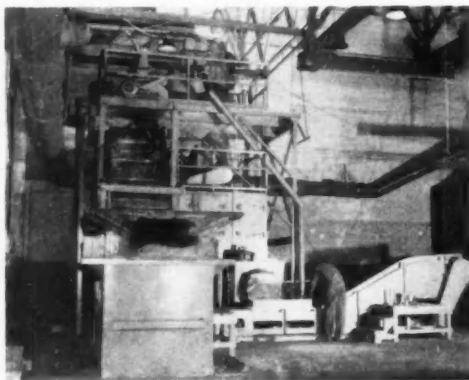
Dearborn Distributors Form Frank Pierce Foundation

To honor the memory of Frank R. Pierce, first president of the Dearborn Motors Corp. who died last May, distributors of Ford tractors and farm equipment have established the Frank R. Pierce Foundation. The purpose of the Foundation is to provide fellowships for advance study for county agricultural agents. Four fellowships will be awarded each year providing a grant of \$2000, plus tuition fees for nine months of advanced study of agriculture at the institutes selected by fellowship winners.

SAE Offers Technical Aid to Armed Forces

SAE again is to play an important role in assisting the military services with technical consultation and advice. James C. Zeder, SAE president, said that a recent meeting with top officials

of the armed forces resulted in interchange of ideas on possibilities of specific projects in which SAE could provide aid and counsel.



Rubber Use May Hit New High in 1951

If all out war or trouble in Far Eastern rubber areas do not intervene, rubber consumption in this country next year may hit a record high of 1.2 million long tons according to John L. Collyer, president, B. F. Goodrich Co. He recommends a seven point program to help this country retain security in rubber quickly. The important points are a rapid step-up in synthetic rubber production from 570,000 tons a year to the authorized rate of 920,000 tons, a

reasonable stockpiling of synthetic rubber, and the increased use of the American product as it becomes available, some exchange with foreign countries of American rubber for crude rubber, and prevention of sales of crude rubber to Russia and its satellites.

Italy Studying Road Problem

Over the prewar period the number of motor vehicles in Italy has shown an increase of 100 per cent whereas the road system has shown an increase of only 5 per cent, with the result that the number of road accidents are increasing daily due to traffic congestion. There is also the real danger that if no step is taken immediately in this connection within a few years the Italian automotive industries will have to close down. This is why the Italian government has started studying the problem of the reorganization of the Italian road system, and is considering the issuance of a public loan of 20 billion lire to cover the cost of road building.

PROCESSES TWENTY

Capable of shot blasting 10 tons of forgings an hour, this big continuous flow cleaning machine installed in the Oldsmobile forge plant makes possible major savings through the elimination of the usual batch type method with its non-productive cycles of loading and unloading. At least 20 different types of forgings are processed through this unit, including steering gear parts, transmission shafts and gears, and connecting rods.

Car Industry Dividends High in Third Quarter

The automobile industry's dividend payments during the third quarter, amounted to \$259 million (the total of reported payments—about two-thirds of all such payments), as compared with \$90 million last year. Normally a heavy payment period, publicly reported dividends for all corporations for the third quarter amounted to about \$1.9 billion as against \$1.4 billion last year, according to the Office of Business Economics.

INDUSTRIES

Aircraft Dominates New War Contracts

The Dept. of Commerce has announced the following contracts for the Dept. of Defense: Aircraft parts—Lycoming-Spencer Div., Avco Mfg. Corp., \$1.9 million; General Electric Co., \$4.4 million; Wright Aeronautical Corp., Curtiss-Wright Corp., \$3 million; Fairchild Aircraft Div., Fairchild Engine & Airplane Co., \$2.2 million; aircraft power plants, Lycoming-Spencer Div., Avco Mfg. Corp., \$9.7 million; aircraft, \$1.4 million, Cessna Aircraft Co.; automotive parts, \$1 million, Long Mfg. Div., Borg-Warner Corp.; and machine tools and equipment, \$1.3 million, Kropp Forge Co.

A \$2.5 million contract, the second the company has received from the Navy for development of the aircraft, has been awarded to the Bell Aircraft Corp. for production of test models of the big anti-submarine helicopter that it is developing for that service. The machine is said to be bigger than any helicopter now in use, weighing 6½ tons, three times more than any such model Bell has ever before built.

The ACF-Brill Motors Co. has announced the completion of the first of six bus-ambulances for the Air Force within six weeks after placement of the order by the Army Ordnance Corps.

Synthetic Rubber Program Hurts Plastics Industry

The expanded synthetic rubber program is playing havoc with the supply of a principal raw material used by the plastics industry. The demand for styrene has been greatly increased since additional synthetic rubber plants have been reactivated and the plastic manufacturers have been feeling the pinch. During the first six months of this year the plastics industry used about 22 million lb of styrene monomers with the synthetic rubber program getting 18 million lb. Tentative plans for the next year call for the rubber industry to use 33 million lb with only 15 million lb for the plastic industry.

Italy's Car Output Up 60% in Nine Months

Italian automobile production jumped nearly 60 per cent during the first nine months of this year, compared with the corresponding period of 1949, according to statistics issued by the National Manufacturing Association. The total was 90,607 vehicles of all types, compared with 56,912 from January to September, 1949. The biggest increase was in passenger cars, which totaled

70,996; light trucks were 11,527; heavy trucks 5711; and buses and coaches 2373. The export increase was moderate, rising from 12,399 units last year to 14,607 in the first nine months of this year, with passenger cars representing the bulk of the business.

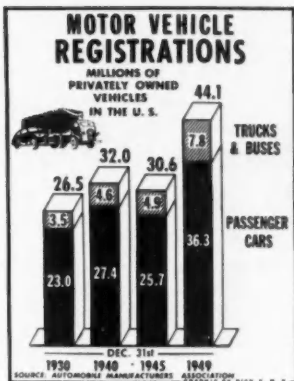
time in as many years that Kropp has expanded its production facilities.

Detroit Tries Fluorescent Street Light System

Detroit is experimenting with a new street lighting system using large, eight-ft-long, tubular fluorescent fixtures. The advantage of the fluorescent system is that it gives a bright almost glareless light. The eight-ft lamps are shielded so that the light is concentrated and are about five times as large as an equivalent incandescent lamp. Two tubes are mounted on each fixture and light is reflected from two highly polished specially designed reflectors to the street through clear plastic windows. The fixtures were designed and built by General Electric.

New Steel Developed for Defense Needs

After four years of research, the Carnegie-Illinois Steel Corp. has developed a new steel for heavy defense equipment. Known as carlilloy T-1, the new steel is said to be nearly twice as strong as normal low-alloy steels, is highly resistant to corrosion, and remains tough at sub-zero temperatures. Military uses would be for ships and other large mobile defense equipment. It will also have civilian application in heavy earthmoving and surface mining machinery.



Kropp Forge Co. to Get Ordnance Forge Plant

The Kropp Forge Co. announced that negotiations have been successfully completed for the acquisition from Ordnance Tank Automotive Center of Detroit of its forge plant at Melvindale, Mich., comprising 148,000 sq ft and formerly occupied by the Timken-Detroit Axle Co. This marks the third

1950 NEW TRUCK REGISTRATIONS*

Arranged by Makes in Descending Order According to the 1950 Nine Months' Total

MAKE	NINE MONTHS									
	Units		Per Cent of Total							
	1950	1949	1950	1949	September 1950	August 1950	September 1949	August 1949	September 1949	August 1949
Chevrolet	31,045	26,158	38.76	36.48	31,045	46,851	31,084	46,851	31,084	46,851
Ford	31,045	26,158	38.76	36.48	31,045	46,851	31,084	46,851	31,084	46,851
International	11,389	13,648	14.36	18.36	11,389	13,648	8,852	13,648	8,852	13,648
G.M.C.	9,249	10,984	11.53	14.40	9,249	10,984	7,621	10,984	7,621	10,984
Dodge	10,821	11,771	13.38	15.58	10,821	11,771	10,523	11,771	10,523	11,771
Studebaker	4,283	4,904	5.27	6.48	4,283	4,904	4,544	4,904	4,544	4,904
Willis Truck	1,749	1,822	2.19	2.36	1,749	1,822	1,223	1,822	1,223	1,822
White	1,243	1,173	1.55	1.54	1,243	1,173	713	1,173	713	1,173
Mark	775	765	.96	.96	775	765	650	765	650	765
Willis-Jeep	895	916	1.10	1.22	895	916	877	916	877	916
Diamond T	535	568	.66	.71	535	568	362	568	362	568
Diveo	438	450	.54	.57	438	450	337	450	337	450
Reo	440	369	.54	.47	440	369	424	369	424	369
Brockway	195	252	.24	.32	195	252	132	252	132	252
Autocar	149	221	.18	.28	149	221	92	221	92	221
Pontiac	83	116	.10	.14	83	116	70	116	70	116
Federal	93	170	.11	.22	93	170	76	170	76	170
Kenworth	82	47	.10	.06	82	47	28	47	28	47
Crosley	23	35	.03	.05	23	35	39	35	39	35
Stirling	34	27	.04	.03	34	27	18	27	18	27
F.W.D.	17	27	.02	.04	17	27	22	27	22	27
Misc. Domestic	158	128	.19	.16	158	128	181	128	181	128
Misc. Foreign	34	23	.04	.03	34	23	287	23	287	23
Total—All Makes	113,784	128,533	100.00	100.00	113,784	128,533	89,253	128,533	89,253	128,533

* Data from R. L. Polk & Co.

News of the AUTOMOTIVE INDUSTRIES



PLACE FOR TWO

This two-place Seibel model S-4 helicopter, designed by Charles M. Seibel, president, Seibel Helicopter Co., Wichita, Kans., has a design gross weight of 1500 lb and actual empty weight of 950 lb. The Seibel S-4 is powered by the Lycoming airplane engine model O-290-D, rated at 125 hp.

Fruehauf Sets Record in Sales, Earnings

The Fruehauf Trailer Co. has reported a new record high in both sales and earnings for the third quarter of this year. Profit totaled \$3,009,695 on gross sales of more than \$38.5 million. For the first nine months of this year, earnings totaled more than \$6.4 million, considerably above the \$5.5 million earned in all of 1948, the previous record year for Fruehauf.

Ethyl Laboratory Forms Information Section

Integration of technical information will be facilitated by formation of a new information division at the research laboratory of the Ethyl Corp. in Detroit. B. H. Weil, previously head of the technical information division of the State Engineering Experiment Station at Georgia Institute of Technology, has been named supervisor. Bernard A. Jones, former head of the research laboratories technical data section, has been named operations manager.

Buick Dynaflo Output Tops 700,000 to Date

Buick built 357,918 Dynaflo transmissions in the first 10 months of this year, bringing its total since the unit first was introduced in 1948 to 711,913. October was the third highest month in

history with more than 39,000 Dynaflo units produced.

Aluminum Cut Order Confuses Industry

The confusion resulting from the government order restricting the use of aluminum indicates the general disorganization stemming from government controls. There has been some difference of opinion within the automobile industry as to just where the cuts apply, but major opinion holds that the controls are on the first processor who does any machining of any kind on aluminum items. If that interpretation stands without change, the effect will be extremely serious on automotive production, particularly for the smaller less integrated companies who buy from many suppliers various castings, forgings, extrusions, and other forms and shapes on which some initial processing has been done.

Basically, the order provides that users of aluminum are limited, starting Jan. 1, within each quarter to 65 per cent of their average quarterly use of aluminum during the first six months of this year. During any one month consumption may not exceed 40 per cent of the permitted quarterly use. Actually, the cut if made across the board would be considerably greater than 35 per cent below third and fourth quarter schedules because during the base period, vehicle production was not as high as it was during the last six

months of the year. Particularly affected by the base period would be companies like Chrysler, which endured a 100-day strike; Packard, and Kaiser-Frazer, both of which were down for model changeovers and had low production during the first half.

As written, the aluminum order offers little incentive for automobile manufacturers to exercise ingenuity in engineering away from aluminum by using substitute materials except in the case of the larger companies which do most of their own machining of aluminum parts. Parts bought in finished or semi-finished form, however, are covered by the limitation order at the vendor level, and there is no provision for a manufacturer to substitute some other material, since he does not realize the benefit from the saving. Another difficulty with substitutes is that materials which might be used in place of aluminum are generally in nearly as tight supply. Another disadvantage is that sweeping design changes might be necessary in the product itself.

Principal uses of aluminum in automobiles and trucks include pistons, castings, transmission housings, miscellaneous die castings, and, in the case of trucks, wheels and other chassis members. There is some opinion that the aluminum order may be modified to provide more flexibility above fabrication level.

The automobile industry is not protesting the limitation on aluminum use so much as the provisions of the order which make it difficult to substitute other materials in order to maintain the highest possible vehicle production consistent with the amount of aluminum available. In other words, they would much prefer to see the limitation apply only to the end product which would give them latitude to make the best possible use of metal available.

At press time a more serious threat in the form of an impending order curtailing the use of copper was imminent. That would present an even more serious problem, since it is much more difficult to engineer away from copper than is the case for aluminum. During the last war attempts were made to use steel in radiators but were not successful. In addition, there is no known substitute for copper in the electrical system such as generators, starters, and wiring.

There is a growing belief in Detroit that Regulation W, the aluminum order, the impending copper order and many more expected controls on materials are part of a general program by the government to curtail industrial production without actually imposing outright production controls.

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

Reo Motors, Inc.—**A. L. Struble** has been appointed general sales manager, succeeding **R. D. Hilty**, who will retire.

Chrysler Corp., Dodge Div.—**W. C. Newberg**, formerly president of the Airtemp Div., was made vice president and director of Dodge Div., and **C. E. Buchholzer**, who has been vice president and director of Airtemp, was made president of Airtemp.

Borg-Warner Corp.—**Mathew Keck** has been elected vice president. He also will continue in his post as treasurer.

Oldsmobile Div., General Motors Corp.—**Maurice J. O'Connor, Jr.**, has been appointed executive assistant to the general sales manager.

General Motors' Research Laboratories—**Dr. Robert F. Thomson** has been appointed as assistant head of the metallurgy department.

Borg-Warner Corp., Morse Chain Co. **J. N. Candler** was named vice president and assistant general manager; **R. J. Howison** was appointed vice president in charge of sales; **E. W. Deck** was named vice president in charge of manufacturing—Ithaca; **M. V. Durkin** was appointed vice president in charge of manufacturing—Detroit; **W. M. Reynolds** was named secretary and treasurer; **E. G. Wuensch** was named assistant treasurer.

B. F. Goodrich Co.—**George W. Vaught**, financial vice president, will retire on Dec. 31.

United States Rubber Co.—**Elmer H. White**, vice president, has been elected a director and member of the executive committee.

Goodyear Aircraft Corp.—**Karl L. Fickes**, former manager airship operations, Wingfoot Lake, O., has been appointed plant manager.

Bell Aircraft Corp.—**Roy J. Sandstrom** was elected vice president in charge of engineering.

United States Rubber Co.—**Joseph A. Conlon**, formerly district sales manager, Chicago branch, has been appointed manager of allied sales for the mechanical goods division. **Edwin D. Meade**, formerly manager of Western railway sales, was appointed district sales manager, Chicago branch, replacing Mr. Conlon.

United Aircraft Corp.—**William Gage Brady, Jr.**, board chairman, National

City Bank of New York, was elected to the board of directors.

Chrysler Corp., Dodge Forge Plant—**Alfred L. Gostow** was appointed plant manager succeeding **Grover Eads** who retired as plant manager.

National Motor Bearing Co., Inc.—**H. K. Pohlman**, formerly president and general manager of Arrowhead Rubber Co., was elected director of manufacturing of N.M.B. **Alvin C. Hewitt**, vice president of Arrowhead, has succeeded **Mr. Pohlman** as general manager of the rubber division.

American Steel & Wire Co.—**Charles H. Eisenhardt** has been named manager of the electrical products sales division.

Kaiser-Frazer Corp.—**Henry A. Houston** has been appointed assistant advertising manager.

Allis-Chalmers Mfg. Co.—**Dr. H. K. Ihrig** was elected as vice president in charge of research.

Ford Motor Co.—**William F. Pioch** has been appointed manager of manufacturing engineering of the newly-formed Aircraft Engine Div.

Willys-Overland Motors, Inc.—**Donald T. Ellis** has been named fleet and truck sales manager.

Ford Motor Co., Tractor and Industrial Engine Div.—**Frank R. Crone** was appointed manager of production engineering.

Doehler-Jarvis Corp.—**Charles Pack**, formerly vice president in charge of production, has been named vice president in charge of the newly formed Engineering and Research Dept. **W. G. Gutmueller**, formerly vice president and secretary of the company, has been named vice president and production manager. **Louis Miller**, director of labor relations, was appointed assistant vice president of the corporation. **Harold L. Samuels**, formerly assistant secretary, has been named secretary of the organization.

National Automotive Fibres, Inc.—**Philip E. Church** was appointed manager of the company's Canadian subsidiary, Canadian Automotive Trim, Ltd., Windsor, Ont.

Northrop Aircraft, Inc.—**George N. Mangurian** has been appointed chief of structures.

Lockheed Aircraft Corp.—**H. D. DuChemin** has been named superintendent of the jet fighter division.

Electric Heat Control Co.—**Kent Fullerton**, sales manager of the company, was elected president.

Allis-Chalmers Mfg. Co.—**Fred E. Haker** has retired as director of purchases and is succeeded by **Kenneth R. Geist**, who formerly was assistant to the director of purchases.

General Controls Co.—**Gordon Steinhoff** has been named manager of the Aircraft Div.

Toledo Steel Products Co.—**Frank Fritz**, formerly chief service engineer, was appointed assistant to the sales manager. **R. L. Allen** has been appointed director of the service engineering department, succeeding Mr. Fritz.

Chain Belt Co.—**Edmund Fitzgerald**, president of the Northwestern Mutual Life Insurance Co., has been elected a director.

Ford Motor Co.—**Thomas R. Reid** was appointed director of the newly created Office of Information on Governmental Affairs.

Howe Scale Co.—**Walter F. Garlow** was appointed sales promotion manager.

Norton Co.—**Robert G. Van Keuren** has been appointed chief sales engineer for the Abrasive Div.

Necrology

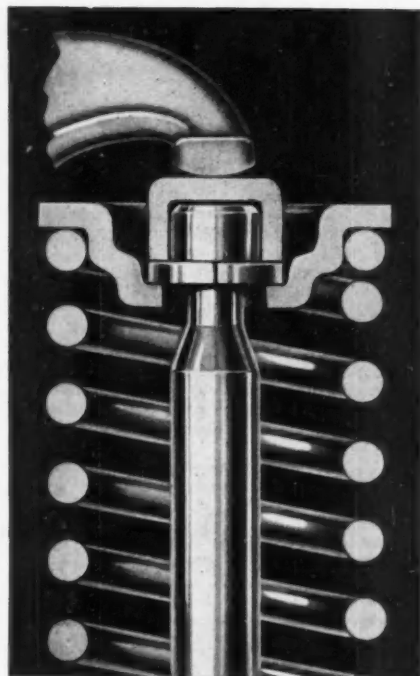
Walter V. Flood, 53, vice-president and comptroller, Electric Auto-Lite Co., died Nov. 7 in Cincinnati, O.

Joseph F. Meade, Sr., 59, aviation pioneer, died Nov. 8 in Bath, N. Y.

Col. Herbert W. Alden, director of engineering and later board chairman of Timken-Detroit Axle Co., died recently in Trenton, Mich.

James Q. Edwards, assistant manager of parts warehousing for GM's Chevrolet Motors Div., died Nov. 4 in Detroit.

Lester M. Taylor, 60, director of car distribution, GM's Buick Motor Div., died in an accident near Norwalk, O., on Nov. 12.



EATON Free-Valves

*Eliminate the Principal Causes
of Valve Failure*

—
*Maintain Performance at
New-Engine Level*

—
Lengthen Valve Life

IN general, valve failures are traceable to valve stem deposits and uneven seat deposits. When the valve is free, these conditions are largely eliminated. Stem deposits cannot build up; seat deposits are reduced and kept uniform. No one part of the valve head is subjected to excessive temperature for sufficient time to cause failure.

The Eaton Free-Valve is composed of a special spring seat washer, a valve stem cap, a pair of half-circle keys, and a special valve stem shape. During the

lift cycle, valve motion is controlled, but not locked so as to prevent movement between the stem and guide. This freedom permits the valve to take variable positions in operation. It has a self-cleaning effect which, in millions of miles of service, has proven its ability to eliminate valve failures between major overhauls and to maintain fuel consumption and power output at approximately new-engine level.

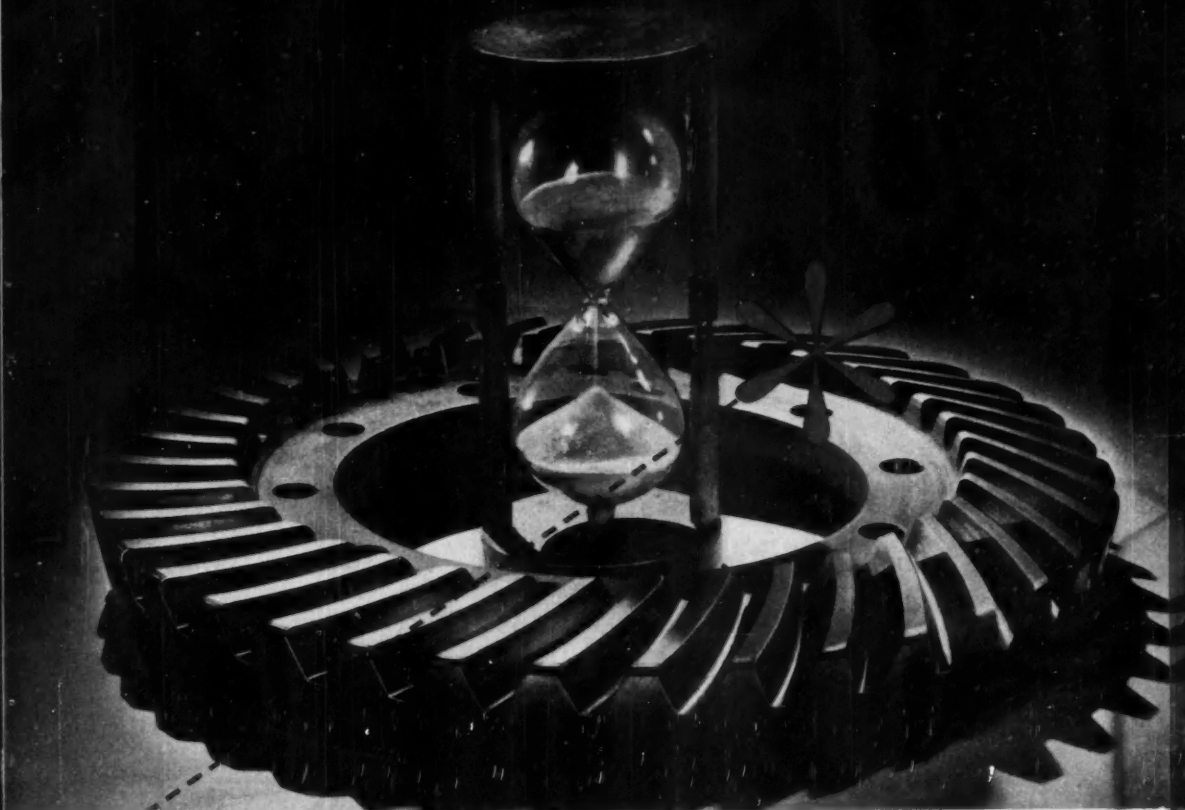
Eaton Free-Valves can be designed into any motor vehicle engine.



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CLEVELAND, OHIO

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EATON PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers



* Does "YEARS" rhyme with "GEARS" for you?

THE HAPPY COINCIDENCE of these rhyming words tempts us to write an advertisement in poetry. But cold business sense sounds better in prose.

The gears you buy should be built to last for years. If they don't—if they require frequent service or replacement—they have a tremendously high final cost, no matter what figures were on the purchase order.

"Double Diamond" gears are built to last for

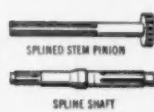
years—to produce low installed cost—to serve economically and dependably on the job for which you buy them—and to do credit to your product and your reputation.

Speaking further of years—"Double Diamonds" have been made to these standards since 1914. We would be pleased to enter our 37th year making gears for you. Why not write for more entirely non-poetic information?



Automotive Gear Works, Inc.
RICHMOND, INDIANA

.....FOR AUTOMOTIVE



.....FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS.....

Reg. U. S. Pat. Off.

An anchor



for paint . . .

a bar



against rust . . .

BONDERITE

belongs

under the finish of fine painted metal products



The enemies of paint begin to work as soon as your product leaves your plant. Moisture, abrasion, scratches and dents injure the paint film and lay the metal bare. The finish on untreated metal will quickly deteriorate.

On Bonderite-treated metal the paint is anchored by the crystalline phosphate coating, integral with the metal. Because it's non-metallic, Bonderite resists rust and corrosion, confines finish damage from scratches to the injury itself. Bonderite-treated products *look better longer*.

Bonderite is the *standard* corrosion resistant paint base. It's used on thousands of painted metal products. Learn how it can help make *your* product better. Write today.

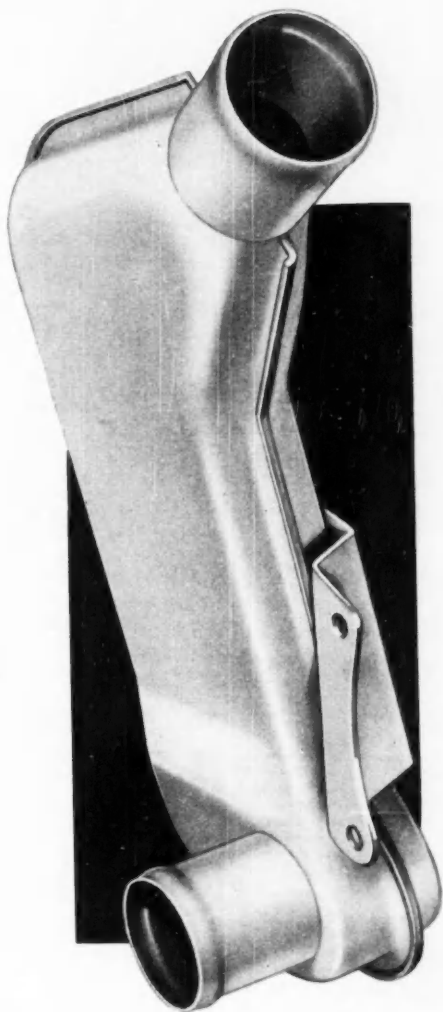
Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

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2178 East Milwaukee Ave.
Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces

HEADQUARTERS...



FOR OIL COOLERS FOR AUTOMATIC TRANSMISSIONS

Having built more oil coolers for automatic transmissions than any other manufacturer in the field, Harrison can be regarded as headquarters for the development and production of these newest cooling units.

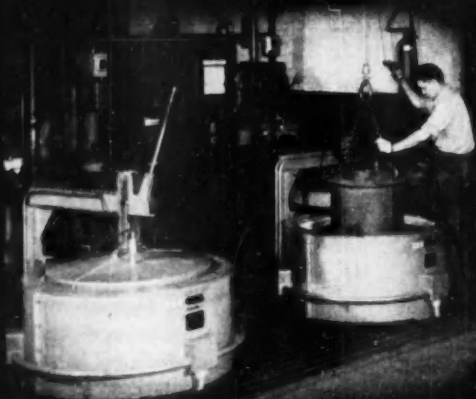
As specialists in the design and manufacture of heat transfer products, Harrison engineers and production men were called in on the automatic transmission. And for each application an oil cooler was designed to meet the specific requirements of the car manufacturer.

Our knowledge, experience and facilities are available to assist manufacturers who have transmission oil cooling problems. Harrison Radiator Division, General Motors Corporation, Lockport, New York.

HARRISON

RADIATORS, THERMOSTATS, HEATERS, DEFROSTERS, OIL COOLERS

We make them
as if we were going to use them



Precisely controlled heat treating is just one of the steps taken at Accurate to assure adherence to your specifications.

... and it lowers
the overall cost of your springs

HERE at Accurate we make springs the way we'd like to have them made for us if we were the user. We believe this guarantees you the best possible springs—uniformly **RIGHT** springs that permit maximum assembly rates and reduce the number of rejects due to faulty operation. It all adds up to lower manufacturing costs and better product performance for you.

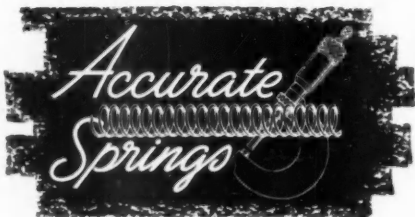
Plan now to find out more about

Accurate spring service and try Accurate on your next job. **ACCURATE SPRING MFG. CO.**, 3810 W. Lake Street, Chicago 24, Ill.

Ask for your free copy of the new revised Accurate Handbook of Technical Data on Springs. This booklet has been out of print for some time and if you have previously asked for a copy and have not received it, we would appreciate your asking again.



*Be sure the
 springs you
 buy are
 Accurate*



*Springs
 Wire Forms
 Stampings*

TODAY

...DESIGNED FOR A SPECIFIC JOB

TOMORROW

...ADAPTABLE TO OTHER PRODUCTION

Conversion Costs Reduced To Minimum

Especially designed for a particular job *today*, the W. F. and John Barnes 924 Vertical Machine, because of its unusual adaptability, will also produce a wide variety of other "special" machining jobs on a production line basis *tomorrow*. Designed for increased efficiency and economy of operation and high production runs, the W. F. and John Barnes Vertical Machine can be converted to handle other production jobs. Only new fixtures and re-tooling will be necessary.

All W. F. and John Barnes Machines are built to order for specific jobs. But, our engineers, well-versed in solving special machining problems, are able to design machines that are versatile and can be adapted to other machining work at a minimum cost.

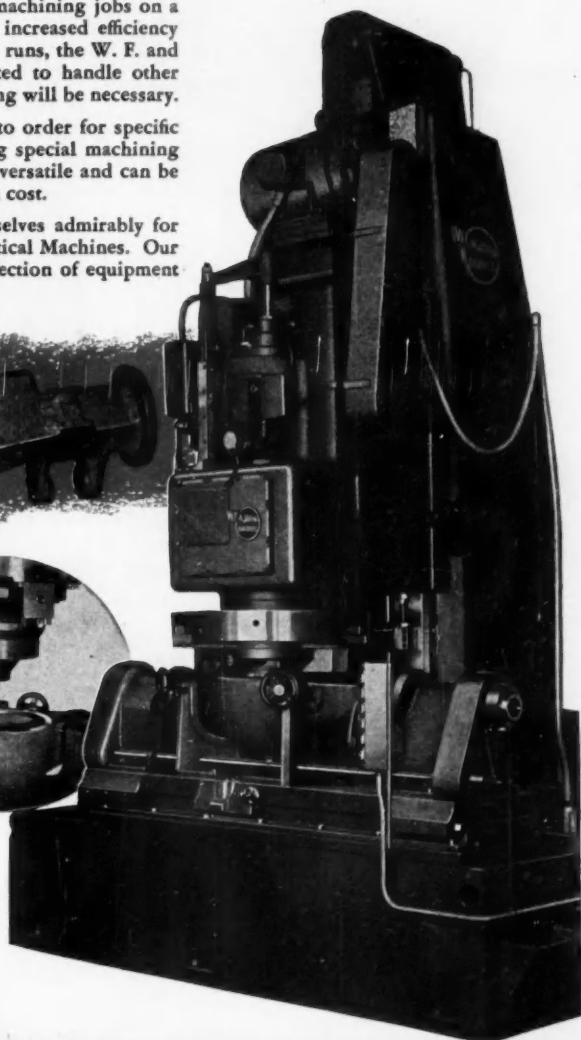
Your metal-working problems may lend themselves admirably for high production on W. F. and John Barnes Vertical Machines. Our engineers will be glad to assist you in your selection of equipment for present-day and post-war production.

**JOB RECORD**

JOB RECORD
In this well-known manufacturer's plant, the W. F. and John Barnes 924 Vertical Machine operates in a cycle of rapid approach, bore and chamfer to depth (positive stop), feed-out face and rapid return, with push-button remote control for starting the cycle.

The piece — an axle housing rough, casting boring and chamfering 15 $\frac{1}{2}$ " diameter; and rough, semi-finish and finish 17 $\frac{1}{2}$ " diameter face. A special holding fixture supplied by the customer, facilitates this work. The entire time consumed for these various machining operations, performed by ONE W.F. and John Barnes Vertical Machine, is 7 $\frac{1}{2}$ minutes.

Our four page bulletin illustrates how the 924 Vertical Machine has been applied to a number of different types of high production drilling, boring and facing operations. This is a bulletin you should have in your files — write for a copy today — Ask for Bulletin No. 345.



**W.F. & JOHN
BARNES**

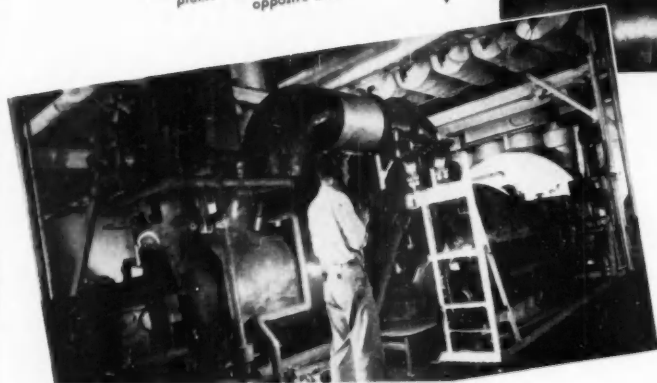
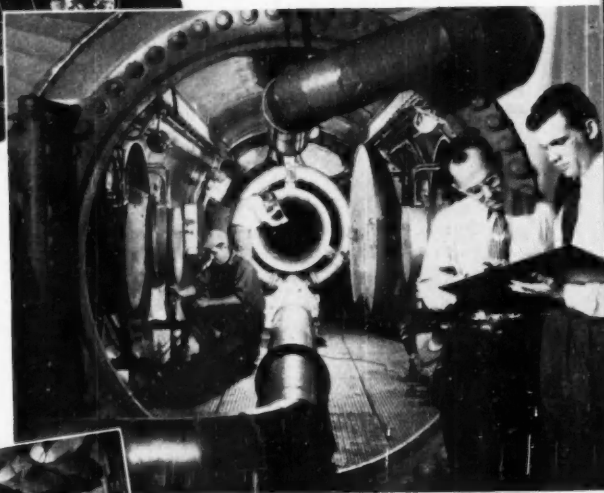
W. F. and JOHN BARNES

312 SOUTH WATER STREET • ROCKFORD, ILLINOIS, U.S.A.

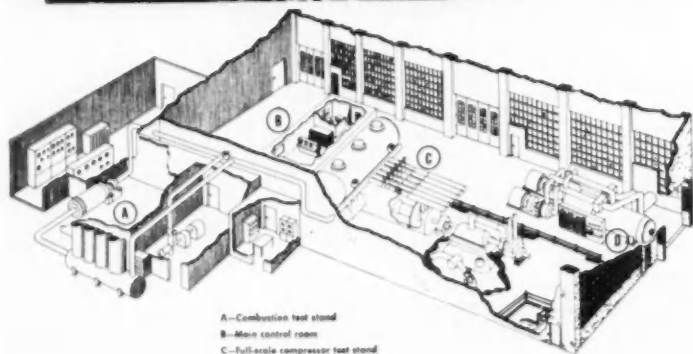


Over 30 technicians take readings at this control board and instruments in the background during operation of the scale model compressor test stand. More extensive instrumentation, consisting of about 700 instruments, is used in the large control room and at the steam turbine control panel of the full scale compressor test stand.

Power for driving a full scale compressor under test is provided by this 35,000 hp steam turbine power plant. The control panel is on the opposite side.



The J-47-GE-23 (Right view at bottom of next page), one of the two new "all weather" turbojet engines being produced by General Electric for the Air Forces. The other engine is the J-47-GE-17 (left view), which will power North American F-86D interceptor planes and will have a considerable reduction in strategic materials. Basically, both engines are the same. They are completely anti-iced and have special ignition systems that make possible starts up to altitudes of 50,000 ft. In addition the "17" engine is equipped with an afterburner and automatic electronic controls for regulating fuel flow. Thrust ratings for both engines are over 5200 lb.

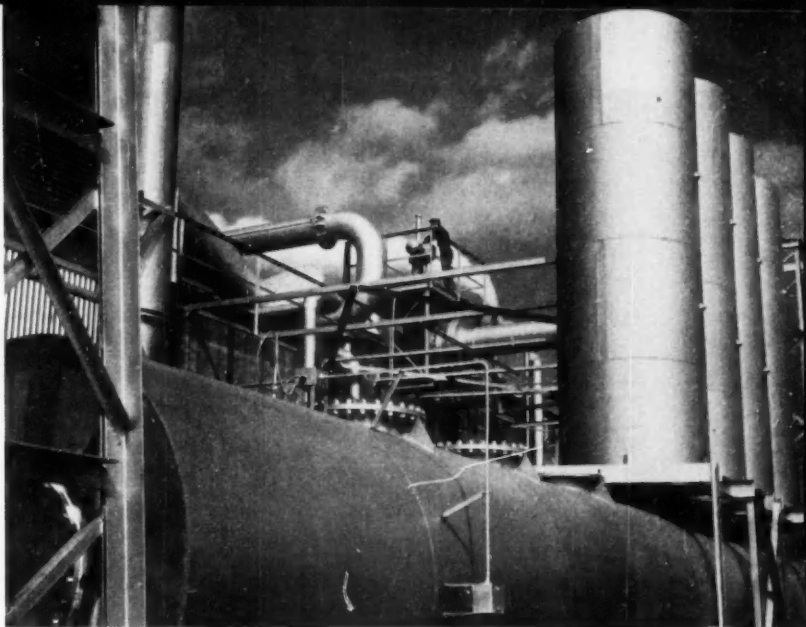


A—Combustion test stand
B—Main control room
C—Full-scale compressor test stand
D—Scale model compressor test stand

Schematic drawing shows major units of General Electric's new \$4 million aircraft gas turbine laboratory at Lynn, Mass., for testing components—full scale and scale model compressors and combustion systems. It was dedicated in November by G-E President Charles E. Wilson in honor of Dr. Sanford A. Moss, pioneer in the development of the turbosupercharger.

Exterior view showing the huge duct in the foreground through which exhaust air is conducted to the silencer stacks.

Insulated and reinforced steel tank, 40 ft long by 10 ft in diam, which is the full scale compressor test chamber. Altitudes up to 70,000 ft and temperatures of 100 F to 100 deg below zero can be simulated in it. Present plans call for additional equipment to permit temperatures up to 200 F. To lower to 70 deg below zero over 14 million cu ft of air per hour are required, which is cooled by utilizing water from the adjacent river and four sets of refrigeration compressors and turbines. For full operation 4,800,000 gal of water are needed per hour.

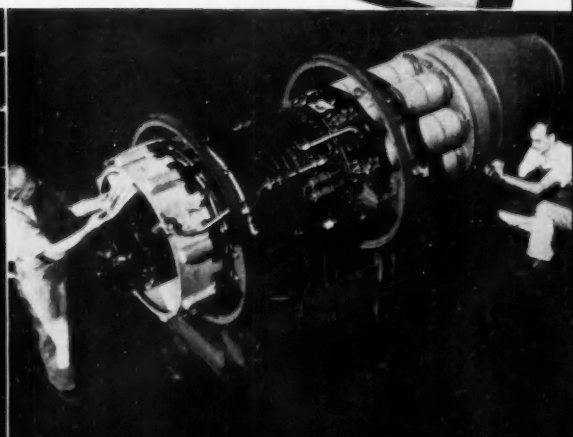
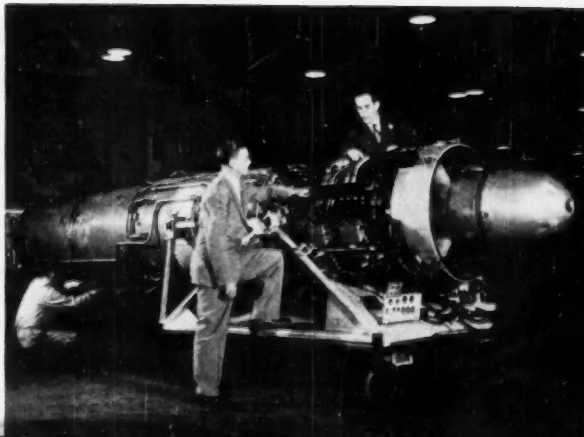


G-E

Dedicates Aircraft Gas Turbine Laboratory

New J-47 Models

These "brain boxes" of the "17" turbojet are the electronic computers that automatically regulate the engine's performance as dictated by the throttle. Information is supplied to them by "sensors" pertaining to engine and air temperatures, altitudes, fuel flows and other variables.



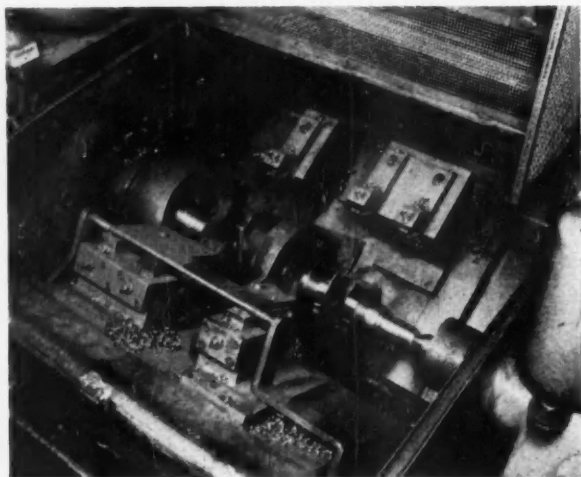


Fig. 1—Setup of a Rocket engine crankshaft in which a set of six negative rake carbide tools in rigid holders make intermittent cuts in turning the OD and angular clearance in counterweights.

SUBSTANTIAL increases in the rate of certain turning and polishing operations on Rocket engine crankshafts have been attained recently through new developments instituted by production engineering men in Oldsmobile's plant at Lansing, Mich. Intermittent cuts now are being made with carbide tools, sometimes considered unsuited for such work; and a special machine designed and built for crankshaft polishing is yielding results which are superior, both in quantity and quality of output, to those previously attained.

Rocket engine crankshafts are forged from SAE 1145 steel and are heat treated to 217-259 Brinell before machining. After part of the machining is done, counterweights then are turned on the OD and faced on one side. As these cuts are intermittent, it was supposed until recently that they could not be made with carbide tools because of the repeated shocks involved.

It was decided, however, to try some of the newer carbides that are more shock resistant and the results secured after considerable experimental work have shown not only that carbide tools can be used but that they can more than double the maximum output previously attained with tools of high speed steel. Because of these results, the job is now in regular production with carbide tools.

In Fig. 1 is shown the setup employed in a 16-in. LeBlond automatic lathe. This is believed to be the first production job using carbide tools for intermittent cuts on crankshaft forgings. Success depended largely upon choosing the right tools, grinding them properly, providing exceedingly rigid mounting, and employing favorable feeds and speeds.

Turning

In the new setup, the crankshaft is driven by an air operated collet chuck at 196 rpm, and a live air-operated tailstock center is used. A six-roller steady rest is provided on the center main bearing journal and contributes greatly to the rigidity of the setup. Turning speed is 378 fpm and the feed is 0.045 in. per revolution. Tools now employed are Wesson metal M but equivalent grades of other makes are satisfactory.

Bits are of solid carbide of $\frac{1}{2}$ in. square section and three in. long. Besides being exceedingly rigid themselves, they are clamped in very heavy holders that afford corresponding rigidity. In making their cuts, the

tools remove up to $\frac{3}{16}$ in. of stock. Feed is across the OD of the counterweights and then down the angular clearance faces, tool motion being controlled by a drum cam. Traverse is rapid up to the point that cutting starts.

Three front and three rear tools are used and all have a seven-deg negative top rake and are set at a five-deg negative angle. Front clearance is seven deg. Both ends of the tools are ground, hence they can be reversed end for end and rotated 90 deg, thus using four corners on each end before being returned to the toolroom for regrinding. Average tool life per grind, however, approximates 400 pieces. When tools become too short for mounting with sufficient rigidity, a new length can be

brazed onto the short piece.

Except for the tooling, the lathe setup is standard. Possible production is 58.6 pieces per hour and the actual attained is 45.2 pieces per hour. As in making other heavy cuts with negative rake tools, the chips are exceedingly hot so a hinged screen cover is provided and kept lowered during the cuts, which are made dry. Most of the heat generated goes into the chips and both the workpiece and the tools remain relatively cool.

Polishing of all crankshaft journals, crankpins and oil seal diameters is now done in a new machine designed by Oldsmobile personnel and built to their specifications. They concluded that both better and faster polishing could be achieved than on machines used previously and this conclusion has been borne out by results attained.

By Herbert Chase

and Polishing *Rocket Engine Crankshafts*

An objective of the new design was to approximate the results attainable in hand polishing but to do this on a production basis with no labor except for loading and unloading the shafts. These are for eight-cylinder, V-type, Rocket engines and are delivered to the machine with all surfaces to be polished ground to a 50-microinch finish. Polishing is required to yield a five-microinch finish and it is believed that the machine polishes approximately 40 per cent more shafts an hour than are polished by other machines in the industry.

To attain hand polishing results, the design of the machine provides for continual change in the longitudinal position of the shaft relative to the abrasive surfaces as its rotation proceeds. Also provided is a gradual decrease during polishing of the pressure applied by the abrasive on the shaft.

Means for accomplishing these results are described below.

In Fig. 2 is shown the front portion of the new machine with a crankshaft in place ready for polishing to start but with the V-block shoes that guide the abrasive tape and press it against the shaft retracted. When the machine is started, the shaft is driven at

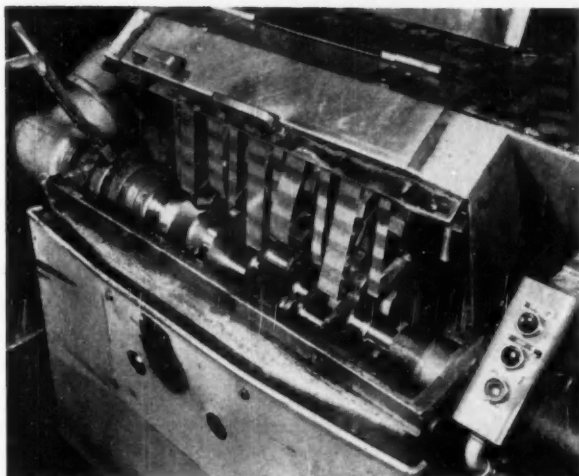


Fig. 2—Front view of the crankshaft polishing machine with a shaft ready for polishing in place but with the shoes that press abrasive tape against the shaft retracted. They move forward when the machine starts. The lever at the left operates a valve controlling an air plunger that moves the tailstock.

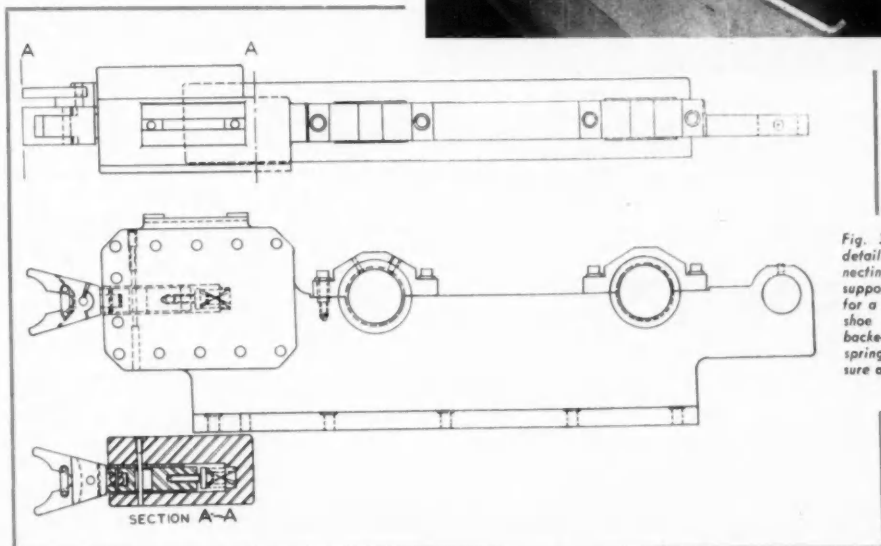


Fig. 3—Side view and detail drawings of a connecting rod and of the support at its front end for a V-shaped polishing shoe whose plunger is backed by a compression spring that applies pressure against the abrasive tape.

Turning and



Fig. 4—Looking down on the secondary crankshaft and the rear portions of the rods that connect this shaft with the master shaft. Also shown is the lubricant tank with piping to bearings.

240 rpm and is continually reciprocated axially $3/32$ in. while rotating. As the shoes and abrasive tape are guided so that they cannot move from side to side, there is constant longitudinal motion of the shaft relative to the paper, fulfilling one objective of the design. To permit of this motion, each shoe and each strip of abrasive is $3/32$ in. narrower than the surface it polishes.

Upon starting, all ten shoes are advanced by cams and press the ten strips of 240-grit abrasive tape against all surfaces to be polished. Each shoe is

backed by a spring and the pressure created by it is at a maximum at the start of polishing. This pressure is decreased gradually by the cams and is at the minimum at the end of polishing, meeting another objective of the design. A ratcheted feed is so arranged that each adhesive tap is advanced $1/4$ in. during each cycle of the machine.

To make the shoes follow the motion of the crank pins, they have to be guided by a master shaft. This shaft is mounted at each end in a bearing carried by a slide. There is one such slide at each side of the machine and they are tilted downward. The same slides carry a duplicate secondary shaft mounted $6\frac{1}{2}$ in. farther back than the

master. Actually, both shafts are duplicates of each other and of the shaft polished and all are geared together so as to maintain precisely the same angular relation at all times.

Mounted on the two shafts built into the machine are eight connecting rods one of which is shown in Fig. 3. Four of these rods reciprocate on the cranks and the others, being on journals or oil seal surfaces, move only as the two slides move the two crankshafts bodily. Each connecting rod has at its lower end a holder or guide for the shank of the shoe. Details of

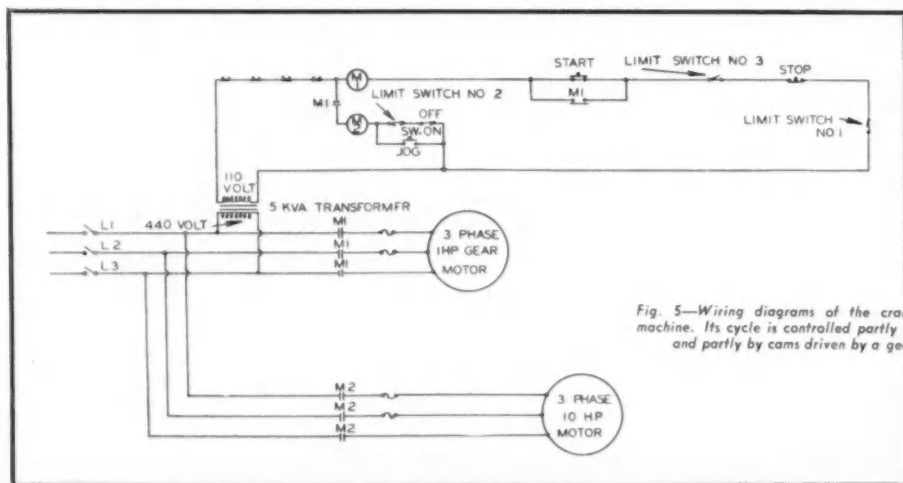


Fig. 5—Wiring diagrams of the crankshaft polishing machine. Its cycle is controlled partly by limit switches and partly by cams driven by a geared motor.

Polishing Rocket Engine Crankshafts

this assembly appear in Fig. 3 and show the location of the spring that pushes the shank and the shoe at its end outward, pressing the abrasive strip against the surface to be polished.

As Fig. 3 indicates, the shoe is somewhat V-shaped but has inside the V two curved surfaces whose radii approximates that of the bearing to be polished plus the thickness of the paper strip, which feeds over a roller at the bottom of the V. In Fig. 4 are shown the rear ends of the connecting rods and above them a tank from which oil is fed under 30 psi pressure to the master and secondary shaft bearings. Any leakage from these bearings is outward and hence any coolant and abrasive thrown from the shaft being polished cannot enter master shaft bearings.

Except for loading, unloading and starting, the polishing machine operates automatically, largely because of the electrical hookup, Fig. 5. After a crankshaft is placed in the machine, an air valve is operated by hand to bring the tailstock into operating position. At the same time, limit switch No. 3 (Fig. 5) is closed. Pressing the start button completes the circuit to the line voltage starter M1 and starts the gear motor. The first cam, driven by this motor, advances the slide, bringing polishing shoes into operating position and compressing the springs back of their plunger shanks. This same cam retracts the shoes after polishing.

Next, a second cam operated by the gear motor closes the No. 2 limit switch, completing the circuit to the line voltage starter M2 which starts the 10-hp motor. This drives all the crankshafts, including that to be polished. After running the specified time, the gear motor operates the cam that opens switch No. 2 and stops the 10-hp driving motor.

A third cam, operated by the gear motor then opens limit switch No. 1, breaking the gear motor circuit at starter M1, but the cam rides past its operating point before the geared motor stops. Finally, the air valve that controls the tailstock is reversed by hand and the tailstock moves back, permitting the polished shaft to be removed and the next shaft to be loaded, starting

the next cycle. With this setup, about 52 crankshafts an hour are polished.

Abrasive tape is fed in the usual way from the ten spools at the rear of the machine, Fig. 6. The 10-hp motor drives the machine through V-belts and these in turn operate the gear train on the crankshafts. The machine is completely enclosed and covers are opened only to load crankshafts or when internal

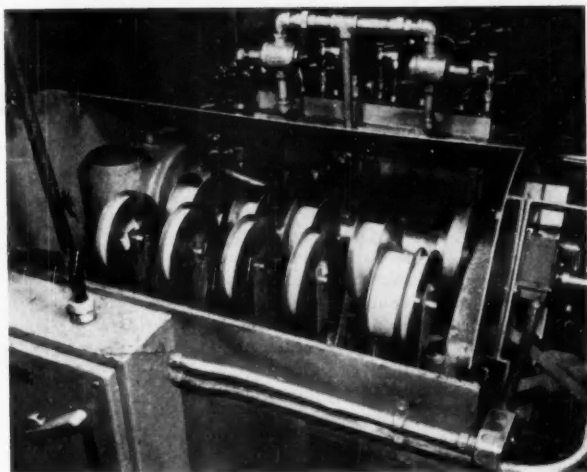
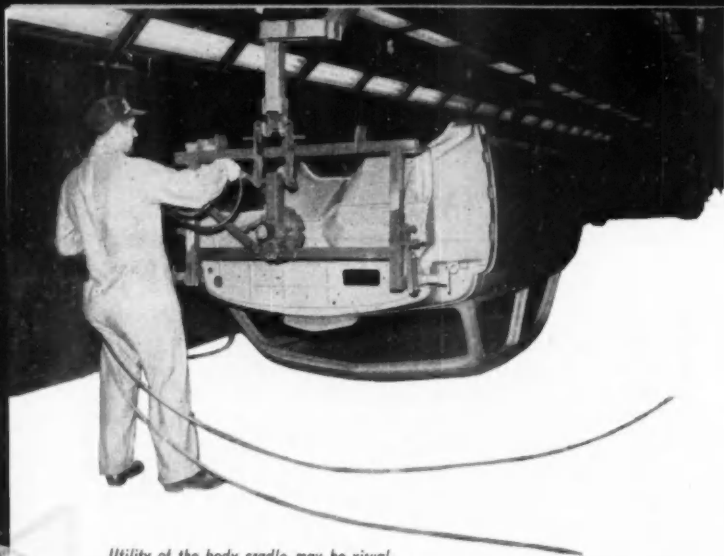


Fig. 6—Rear view of crankshaft polishing machine, showing the ten reels from which abrasive tape is fed, by a ratchet mechanism, between the polishing shoes and the crankshaft bearing surfaces to be polished.

parts must be reached. There is a transparent cover over the polishing compartment and coolant is sprayed on the shaft while polishing proceeds.

Reciprocation of the crankshaft being polished is effected by an eccentric stub shaft connected to the work cradle by an adjustable connecting rod.

In addition to producing faster work and better finish, which is highly enduring, the new machine affords better working conditions for the operator.

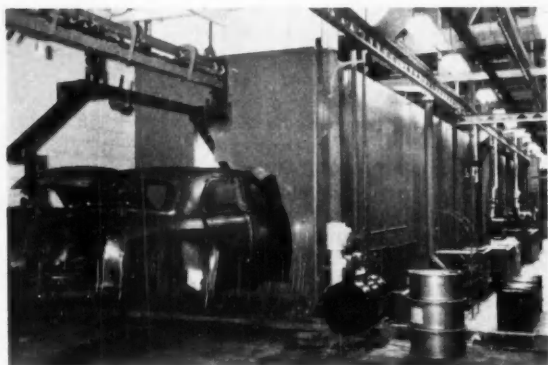


Utility of the body cradle may be visualized from this view in one of the spray booths where it is turned bottom side up. It is turned in this position too for the trip through all paint drying ovens to prevent accumulation of dirt on the top and other finished surfaces.

Completely

By Joseph Geschelin

First stage of operations in the paint shop is that of traversing the six-stage Banderise unit for metal cleaning and rust-proofing. Note that bodies flow through the paint shop while mounted on the universal cradle seen here. As the bodies enter the dry-off oven they are turned on edge.



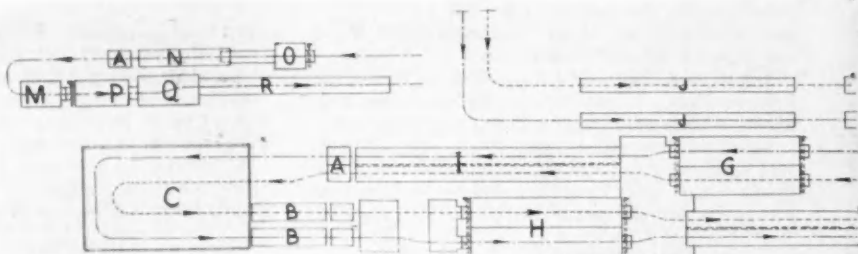
ONE of the impressive features of the new De Soto body plant is the extensive paint shop operation which is completely conveyORIZED and rendered automatic in cycle from start to finish by means of a system of electronically synchronized conveyors. The introduction of power and free conveyors coupled with synchronization makes possible the scheduling and dispatching of bodies from body-in-white to the paint shop, the traverse through the paint shop line, and scheduling of finish-painted bodies to repair or two-tone and to the trim line.

This is the second article on the De Soto plant, the first installment (see AUTOMOTIVE INDUSTRIES, Nov. 1)

having covered some of its more general features.

In the current setup the paint shop schedules a choice of 15 different colors including two-tone treatment. Each body receives a total of five coats, includ-

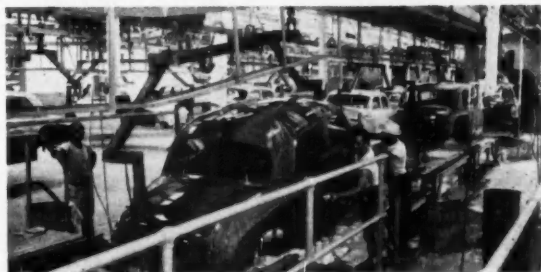
A—Cooling tunnel,
B—Drying ovens,
C—Drain deck,
D—Finish bake,
E—Prime bake,
F—Prime spray,
G—Sealer spray,
H—Finish spray,
I—Sealer oven,
J—Stage Banderise.



Conveyorized *Paint Shop Operation*

Automobile Bodies Are Handled in De Soto's Paint Shop on Electronically Synchronized Conveyors, and Routing is Practically Automatic from Start to Finish.

Here is a perspective of the prime wet deck layout. It is of interest that the water used in this department is warm and pleasant to handle even in cold weather. Water is collected from the hundreds of welding machines and recirculated to the wet deck while still warm.



ing the rust-proof coating and two color coats.

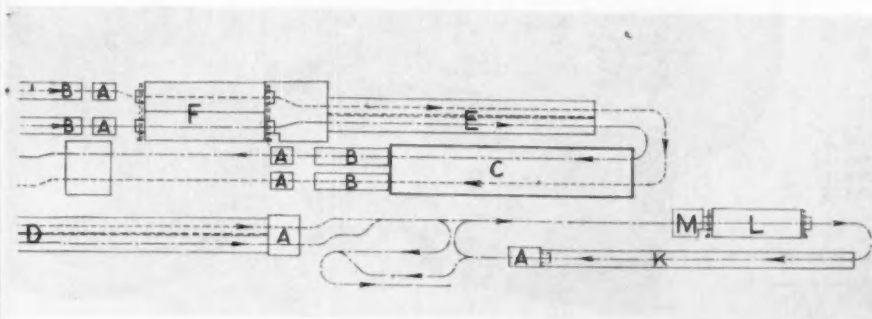
For quick reading we have summarized some of the major statistical data on paint shop equipment in the appended table. It gives the function of each of the units in the order of its sequence on the floor plan layout, the first column giving the number of units installed wherever multiple units are used. The number of stages in each oven are given together with the temperature at which the atmosphere is held.

In keeping with the modernity of the installation, it is of interest to note the enormous volume of air handled in this system. Total capacity, as shown on the summary table is 1,640 cfm (see page 98). In addition, the repair after trim section has two

air supply units having a capacity of 132,000 cfm.

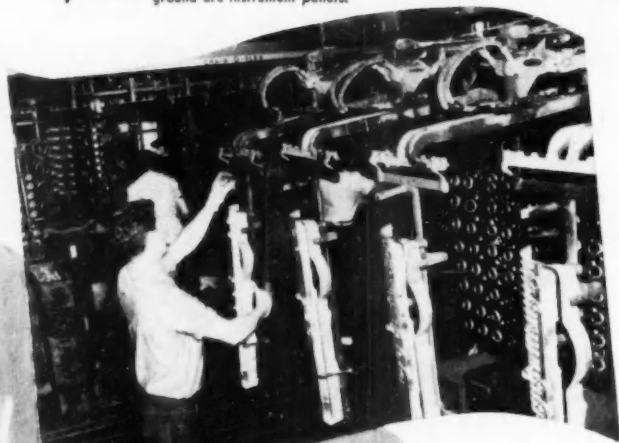
Referring to the chart, in all cases where air is shown as being exhausted but not supplied, it is recirculated from the air introduced into the area. Generally speaking, air is preheated, washed, reheated, and filtered in the penthouses. Each air supply unit is provided with two sets of line burners—the preheat burners for handling air from -10 F and raising temperature to 45 F; and the reheat burners for handling

(Turn to page 96, please)



K—Two tone oven,
L—Two tone booth,
M—Tack tag, N—
Prime repair oven,
O—Prime repair
spray, P—Finish
repair spray, Q—
Demasking en-
closure, R—Finish re-
pair oven.

Close-up of one side of the Hanson-Van Winkle-Munning chromium-plating machine, showing some of the variety of parts processed through this automatic unit. The large die castings in the foreground are instrument panels.



View in the die casting department—this is the Cleveland Universal die casting machine, fitted with a Lindberg melting furnace at one end.

End view of one of the instrument panel assembly lines.



Latest Equipment in King-

SITUATED a few miles outside of Ann Arbor, Mich., the home of King-Seeley Corp., is its new Scio plant boasting a floor space of some 135,000 sq ft. The operation in its present form has been in full swing for several months.

At the present time it is set-up for producing several types of governors, the assembly of several instrument panels, assembly of speedometers for numerous motor car manufacturers, and a specialty line of appliances apart from its automotive activity. To serve these requirements, the plant contains a sizeable zinc die casting department, a large electroplating department, a paint department, and facilities for assembly and machining.

The object of this article is to comment briefly on some selected highspots of the operation. This,

By Joseph Geschelin

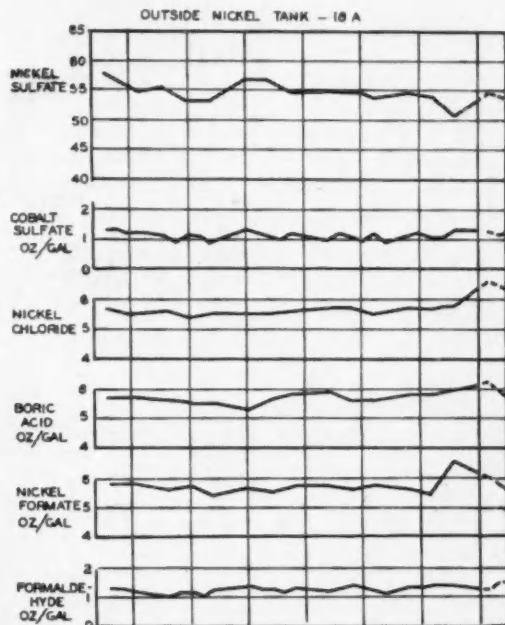
Seeley's New Plant

together with selected views at various points, will enable the reader to visualize the character of the new plant.

The self-contained die casting department has a battery of four large AC die casting machines and one Cleveland Universal die casting machine. Each of these units contains its own melting furnace as an integral part of the machine, the Cleveland machine being fitted with a Lindberg furnace. In addition, the department is provided with equipment for remelting and salvaging scrap material.

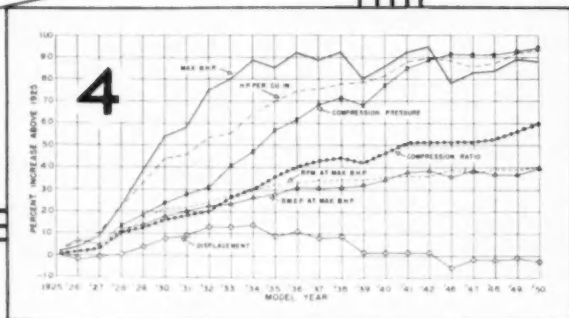
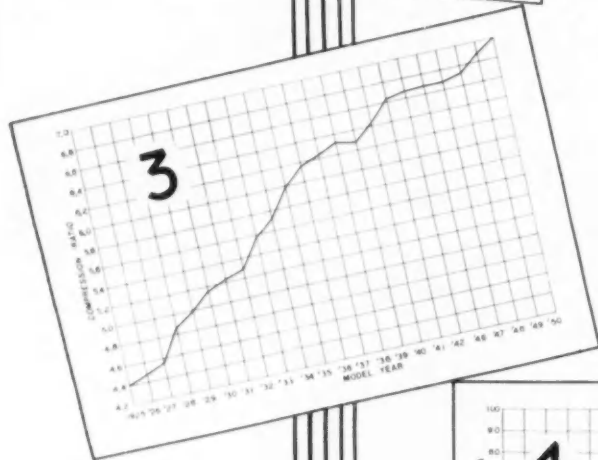
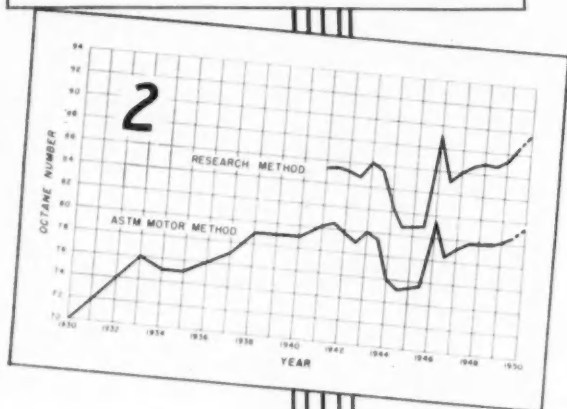
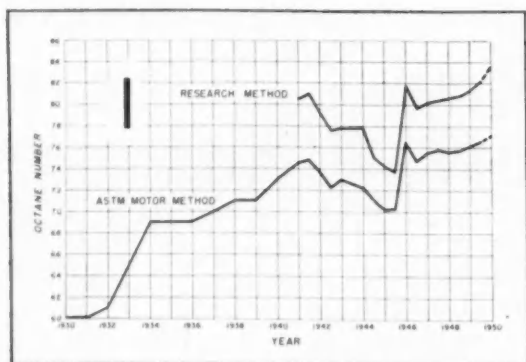
In the bay nearby is a line of small presses for trimming die castings prior to machining. Trim stock is arranged to drop down a chute at the back of each press and then onto a belt conveyor. This conveyor traverses the press line, then transfers the scrap material to a flight conveyor which carries the load directly to the remelt furnaces.

Die-cast instrument panels
(Turn to page 72, please)



As mentioned in the text, system of statistical quality control is applied to various tanks of the electroplating machine. This is a sample chart giving the criteria for controlling the outside nickel tank. This record is built up by one of the laboratory chemists.

Here is one of the legs of the mechanized assembly conveyor for speedometer assembly. It consists of the 36-in. belt with assembly and inspection stations on each side.



Trends in Fuels and Engine Design

THESE four charts show how octane numbers of gasolines and factors of engine design have varied over the years. Composite averages of Ethyl Corp. and Bureau of Mines surveys are used for Fig. 1 and Fig. 2. Fig. 4 is based on averages of values listed in trade publications.

Fig. 1—Antiknock quality of regular gasolines sold in the United States.

Fig. 2—Antiknock quality of premium gasolines sold in the United States.

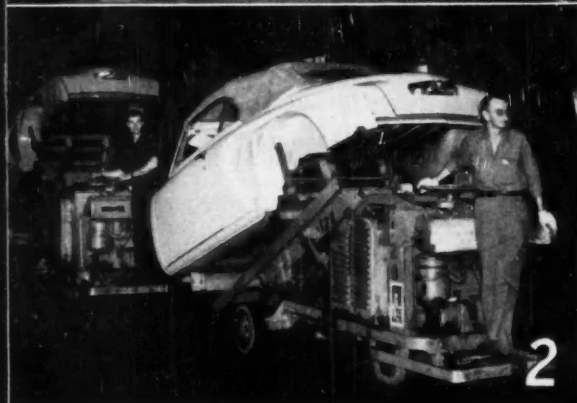
Fig. 3—Average standard compression ratios of passenger car engines since 1925.

Fig. 4—Trends of American passenger car engine design since 1925.

Special Body Handling

Saves

Storage Space



BY storing passenger car bodies vertically instead of horizontally, the Studebaker Corp. is able to place several times as many in the same floor area at its South Bend plant. This method has effected large savings in expenditures for additional storage space.

Power trucks engineered for the job are used to transport automobile bodies in and out of temporary storage and to feed them at regular intervals to car assembly lines. Bodies completely assembled and finished are handled by a fleet of 12 of these special-purpose trucks which in their maneuvering hold to an assembly-line schedule timed in seconds. It is an example of how these and similar manufacturing operations may be synchronized by means of trucks.

Thousands of standard type trucks such as the forks and platforms are used for routine material handling in the automobile industry. Many kinds of attachments and fixtures have been developed to expedite specific classes of work in the foundries, forge shops, stamping and machining departments. But moving car bodies, including storing them in vertical position, presented an entirely different problem.

It was solved by designing a power truck

(Turn to page 82, please)

1. On arrival at car assembly plant bodies are carried by a special continuous-type elevator to the floor where final assembly starts. They are picked up at the elevator by an overhead rail device and moved the few intervening feet to where they are loaded onto an Elwell-Parker power truck.

2. Power trucks transporting passenger car bodies in storage areas. Bodies are held securely in the handling unit and operators, facing forward, run the trucks at about 400 fpm.

3. Each body rests on a temporary wooden fixture, attached to its front end during assembly, which supports it off the floor and leaning a few degrees from vertical. A single line fork at the truck's base runs under the body at the same time that the truck's arms engage the opposite end of the body. The load is elevated and tilted backward 45 deg. for transporting.

Radial

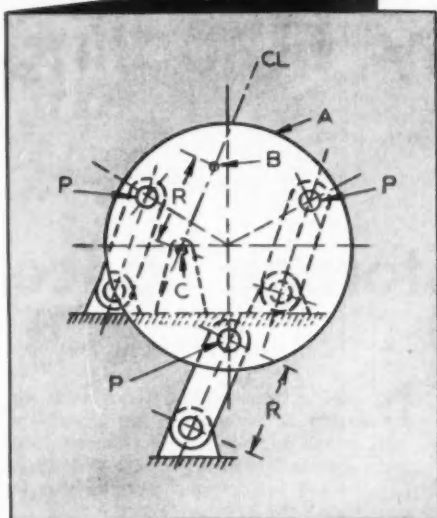


Fig. 1 — (Left) Arrangement of disk and links.

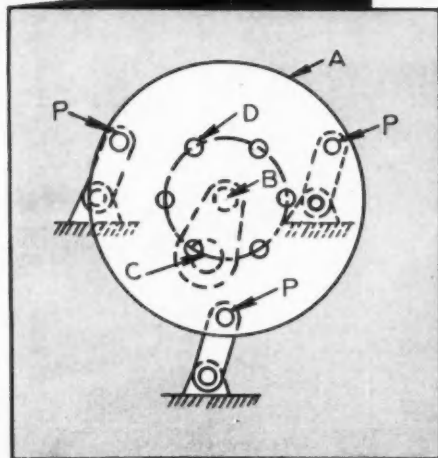


Fig. 2—Schematic illustration of links, disk, wrist pins, and crank.

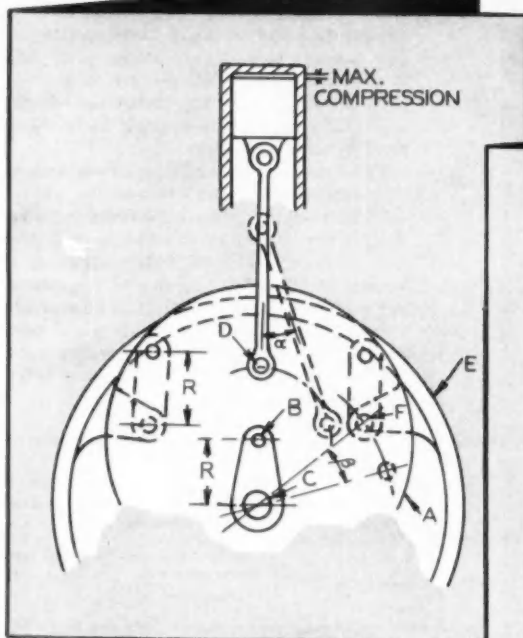


Fig. 3a— (Above) Position of links, disk, connecting rod, etc., for maximum compression ratio.

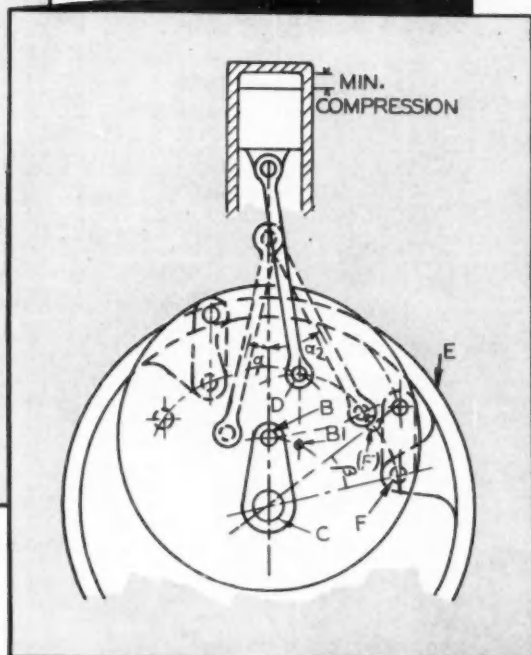


Fig. 3b—(Right) Position of same elements shown in Fig. 3a when adjusted for minimum compression ratio.

Engine

with Variable Compression and No Master Rod

By G. S. Hoell

Franklin Institute of the State of Pennsylvania

At the beginning of World War II it became apparent that production of fuel for airplane engines had to be stepped up considerably and at an ever increasing rate to meet the demand for high octane fuel. It occurred to the inventor of the system described in this article that if the compression ratio of the engine cylinders could be varied by the pilot during flight, not only could he fly at an optimum rate of fuel consumption, essentially a function of altitude and speed, but he could thereby increase his cruising radius considerably with a given load of fuel.

In developing this feature of the Sharpe engine, an equally important innovation offered itself as a by-product of the mechanical solution of the original problem. The generally accepted system of employing a master connecting rod, the crank end of which moves

as any usual connecting rod, while the remaining rods do not, had to be discarded. In the place of this system the inventor used the simple idea that if a disk, such as "A" in Fig. 1, is suspended on three or more links of equal length "R," the disk can perform a translatory and rotational motion in such a way that any random point "B" of the disk will move around a center "C" of a circle whose radius is "R," and whose centerline CL is parallel with the center lines of the links.

If the point "B" is chosen as the geometrical center of the link pins "P," such as in Fig. 2, then this center may be chosen as the wrist pin center of a crank turning around center "C." The disk "A," Fig. 2, can now be provided with evenly spaced auxiliary wrist pins "D" to which connecting rods from radial engine cylinders may be attached. Such arrangement is indicated schematically in Fig. 3a. The disk

(Turn to page 102, please)



Fig. 4a—(Above) Cutaway exhibition model adjusted for maximum compression ratio. B—crankpin, D—wrist pin, E—ring, F—link, L—lever to rotate ring.

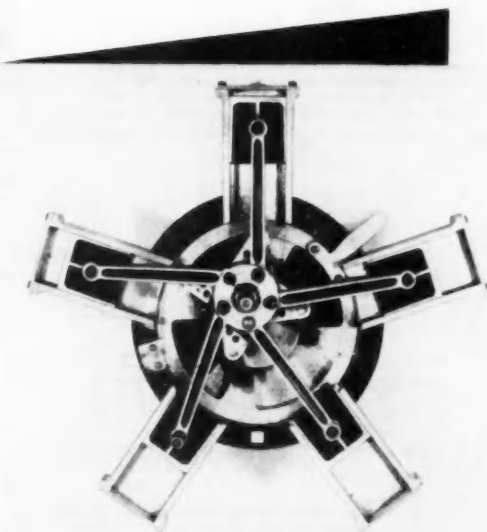


Fig. 4b—(Right) Same model as shown in Fig. 4a with ring in position for minimum compression ratio.

Gas Turbine Powered Boat

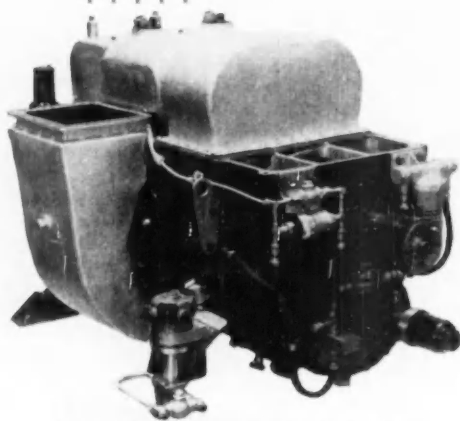
Undergoes Tests in England

ROVER Co., England, is believed to be the first firm to have installed gas turbine engines in a power boat. The engines, similar to the gas turbine used in the experimental Rover car, are part of an order which has been placed by the Royal Navy for use in rescue craft.

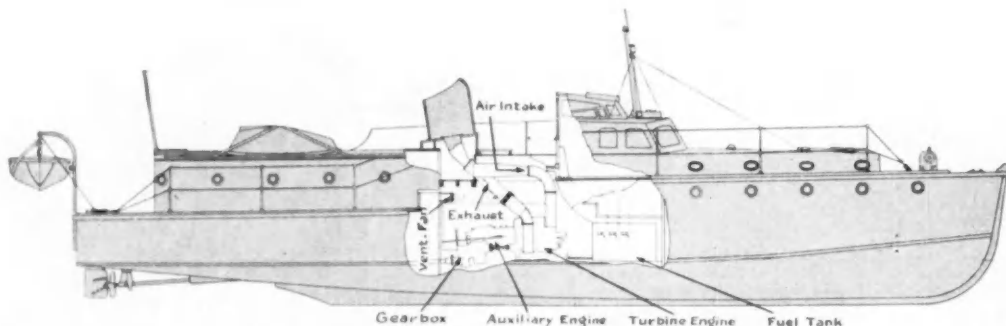
A converted 60-ft sea rescue craft, in which two engines have been installed, is being utilized for demonstration purposes. Although designed for an output of 200 hp, the gas turbines in the boat are limited to 110 hp. With a width and height of 30 in. and a length of 48 in. per engine, the 450-lb gas turbine engines are very compact.

Each engine drives through a Wilson type gearbox and spur gear reduction—total reduction is seven to one—to a propeller. The single stage centrifugal compressor has a single side impeller and runs at a maximum of 40,000 rpm. Diesel fuel is burned in two combustion chambers. Hot gases from the combustion chambers are discharged to a primary turbine. This turbine—machined from a Nimonic 90 forging, complete with blades—is used to turn the compressor and has no mechanical connection to the output shaft which is driven by a secondary or power turbine. The secondary turbine runs at a maximum speed of 30,000 rpm. Auxiliaries comprise an automobile type starter motor with a step-up gear of three to one, a generator running at 6000 rpm, a gear type oil pump, and a fuel pump.

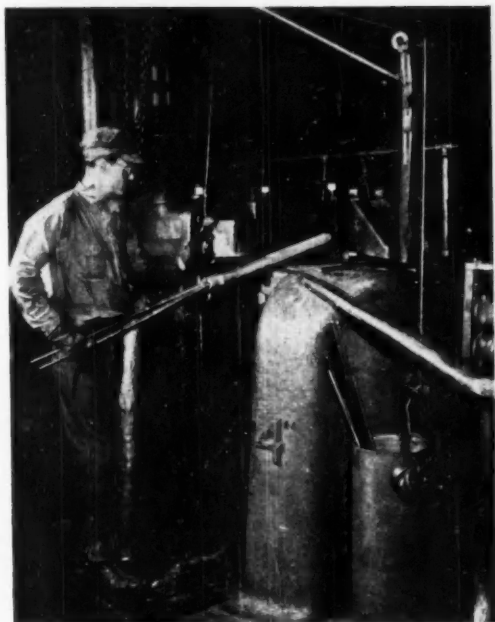
At present the specific fuel consumption is about
(Turn to page 73, please)



The Rover gas turbine engine shown here uses a single stage centrifugal compressor, two combustion chambers, a primary and secondary turbine, along with the necessary accessories. This engine is similar to the gas turbine used in the Rover experimental automobile.



This cutaway drawing of the converted 60 ft sea rescue craft shows the installation of the turbine engine, gearbox, auxiliary Diesel engine for emergency purposes, intake and exhaust ducts, and other equipment. Two gas turbines, each connected to its own gearbox, are used in the vessel.



One of the three new upsetters at Ford's Canton Forge plant.

SOME impression of the progress made in the design and productivity of heavy duty forging machines may be gained from the experience at the Canton Forge plant of Ford Motor Co. During

Productivity Up 30 Per Cent

the past year this plant acquired three of the four-in. upsetters, one of each being supplied by Ajax, Hill-Acme, and National. Intended to replace older and obsolete machines, this equipment has been found to increase productivity well over 30 per cent above the best performance of the older types they replaced.

The new machines are particularly effective in the production of various pierced forgings because of their excellent condition and ability to maintain good tolerances. At the present time the Hill-Acme and the National machine are capable of handling all of the requirements for pierced forgings. The Ajax machine is therefore used for the other types of forgings at this writing.

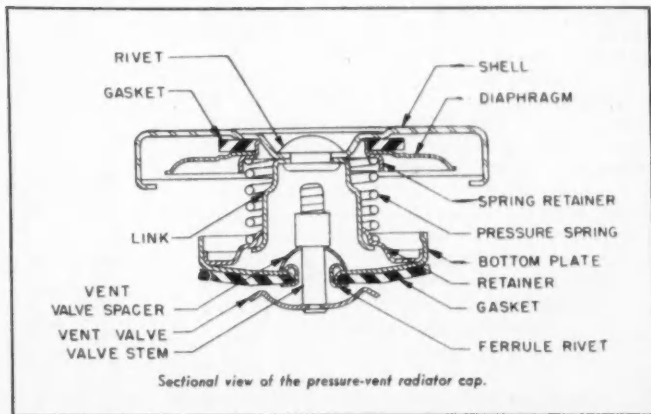
Among the pierced forgings produced here are: Flanged universal joint, motor end; transmission reverse idler gear; and differential side gears.

Pressure-Vent Radiator Cap

SAFEGUARD against excessive loss of coolant during high temperature driving conditions, and operation at atmospheric pressure during normal driving conditions are the two important features provided by the new pressure-vent radiator cap which is now standard equipment on all Chrysler Corp. cars.

In addition to venting the cooling system during all normal driving operations, the pressure-vent radiator cap has been designed to provide even safer removal of the cap during the few times that pressure does occur in the system. The radiator filler neck is similar to that used on other cars in that it incorporates a slight ramp and a stop. When the cap is turned it rises on this ramp and thus unloads the pressure spring and gasket. This permits

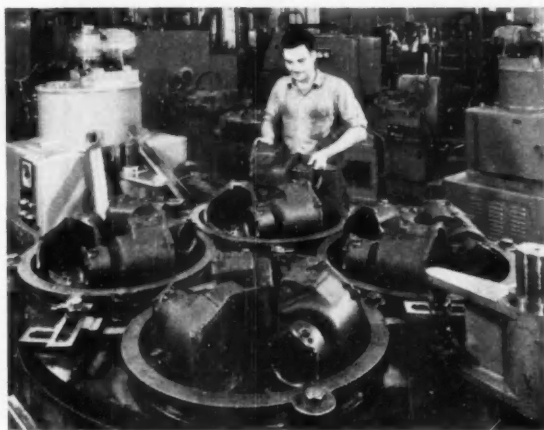
(Turn to page 78, please)



Lapping 12 Powerglide Cases Simultaneously

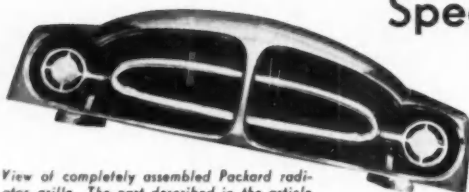
ONE of the most significant advances in manufacturing techniques is the high productivity machine lapping method adopted by the Chevrolet-Cleveland Division where the Chevrolet Powerglide transmission is made.

This view shows one of the newly installed, 72-in. table, Crane Lapmaster lapping machines arranged for lapping the various large gasket areas on the Powerglide transmission case. Three cases are nested in each work-holding fixture. The lapping cycle therefore handles 12 of the large cases at one time.



Chevrolet has found that this method is effective in developing acceptable surface finish with an excellent degree of flatness, assuring oil tightness with gasketed joints.

The same type of machine is also used for lapping the large servo cover.



View of completely assembled Packard radiator grille. The part described in the article is the outer frame of this assembly

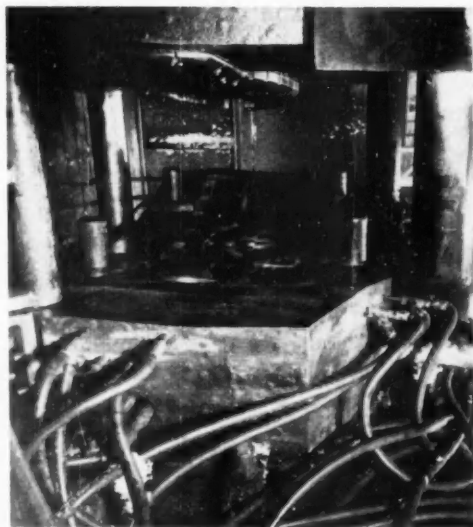
Special Equipment for Making Huge Die Cast Grille

THE radiator grille for 1951 Packard cars has the distinction of being just about the largest plated automotive die casting currently in production. Moreover, the production of this die casting by Doehler-Jarvis at Plant 2 in Toledo involved the development of one of the largest die casting machines known to the art, unique polishing techniques, and one of the largest plating installations in the industry.

The Packard grille, as illustrated, is an assembly composed of the outer frame which is the subject of this study, an inner frame of two sections, and a vertical bar in the center. The outer frame, a zinc alloy die casting, is 60½ in. long, 16½ in. high

(Turn to page 76, please)

Big Doehler die casting machine with die in open position to show size and character of the die impression



Heat-Treating Setup for Smooth Flow of Materials

By Roy F. Kern

Allis-Chalmers Mfg. Co.

A—Surface Combustion radiant tube-fired tray pusher carburizing furnace. These two-row tray pusher furnaces have three heating zones; the first two maintained at 1700 F and the last at 1550 or 1000 F, depending on whether the gears are to be quenched directly.

B—Surface Combustion RX atmosphere generators; capacity 3600 cfm each. These units supply RX gas for the carburizers (A) and hardening furnace (C).

C—Surface Combustion rotary-hearth radiant tube-fired hardening furnace used for reheating prior to quenching gears slow-cooled from the carburizing furnaces.

D—Surface Combustion Standard-Rated large oven furnaces used to burn off the oil and soot from the carburizing trays and fixtures after oil quenching.

E—Surface Combustion flight-type conveyor air draw furnaces for drawing carburized gears after hardening; equipped with washers for removing the quenching oil from the gears.

F—Hevi-Duty carburizer—This design of furnace is particularly suited for case hardening stem pinions and shafts as parts can be suspended vertically to reduce distortion in hardening.

G—Leeds and Northrup Carburizer—For the same purpose as "F".

H—Mannifin centrifugal quenching press for quenching large, final drive ring gears.

I—Gleason quenching press for die quenching gears.

J—Dennison hydraulic arbor press for pressing quenching plugs from hardened gears.

K—Leeds and Northrup Homa-Draw pit furnace for specialized tempering.

L—Lindberg Cyclone pit draw furnace for same use as "K".

M—Bell and Gossett quench oil conditioning system consisting of heat exchangers, strainers, and temperature control.

N—Propeller agitated quenching tank designed by Allis-Chalmers for this application.

O—W. W. Sly table style blast cleaning machine used to clean all heat-treated parts prior to inspection.

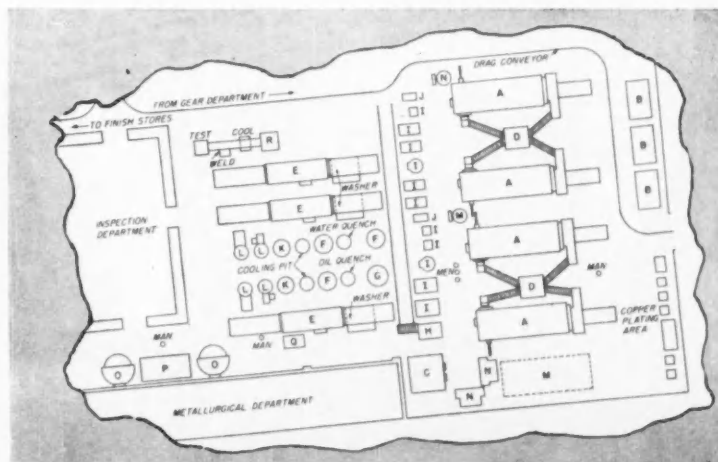
P—American Wheelabrator "Wheelapeening" machine for cleaning and shot-peening stem pinions and shafts prior to inspection.

Q—Mannifin 150-ton hydraulic straightening press for hot straightening case hardened stem pinions and shafts.

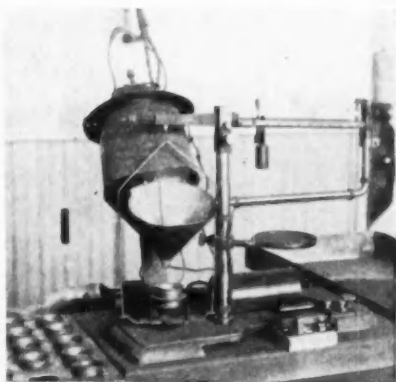
LAYOUT of a heat-treating department is obviously important since not only is floor space extremely valuable but the correct positioning of equipment provides for a higher quality due largely to the reduced hazard of missed operations and reduced damage in handling. Proper layout at Allis-Chalmers with consequent smooth department operation also has a desirable effect on the morale of employees since efficiency instills job pride.

Direct flow of material is usually quite simple to provide, but the efficient utilization of manpower is more difficult due principally to the long cycles necessary on some heat-treating operations. A general rule in this respect is to double up on duties until a man is occupied at all times. This is accomplished as shown in the figure.

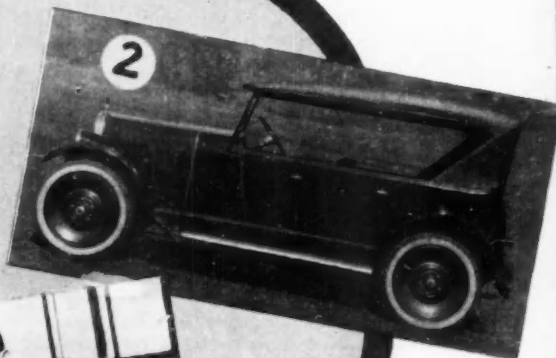
It will be noted that one man charges all continuous carburizing furnaces. Three men quench all gears, deliver them to the low temperature draw furnaces, and thence to the shotblast machines where a fifth (Turn to page 73, please)



Milestones



(1) First model of electrically-controlled grapho-bronze dispensing and weighing device, (1922)



(2) First production car with quick drying lacquer finish was this 1923 Oakland.



(3) Fuel knock was investigated in 1924 by the use of the bouncing pin apparatus shown here.

(4) Twenty-five years ago General Motors was experimenting with a small car. This one originally planned for export, was designed by Fabio Sergardi



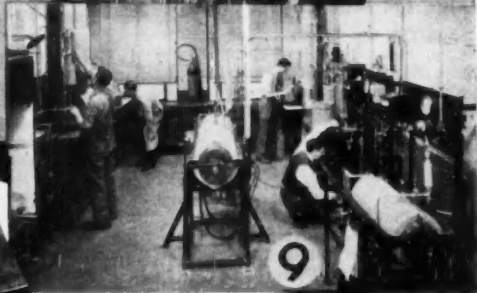
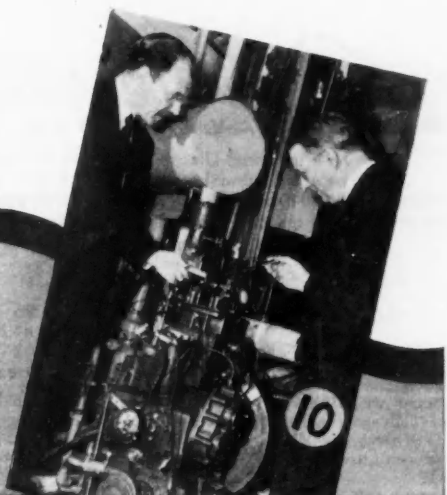
(5) C. F. Kettering and Wheeler G. Lovell are shown working on a small experimental furnace for hydrogenating (hydrocarbons). This work in 1928 was one phase of the development of the correlation between molecular structure and anti-knock quality of hydrocarbons. Mr. Lovell is now associate director of research on combustion, Ethyl Corp.



in Research

This Year Marks the 25th Anniversary of General Motors Research Laboratories. The Illustrations Presented Here Show Beginnings of Some of the Important Developments at This Great Research Center.

Here is the single cylinder test engine (1945) for original work on 12 to 1 compression ratio engine. Left — Earl F. Carl, head of Advance Engine Development Dept. Right—R. V. Hutchinson, Product Studies No. 5.

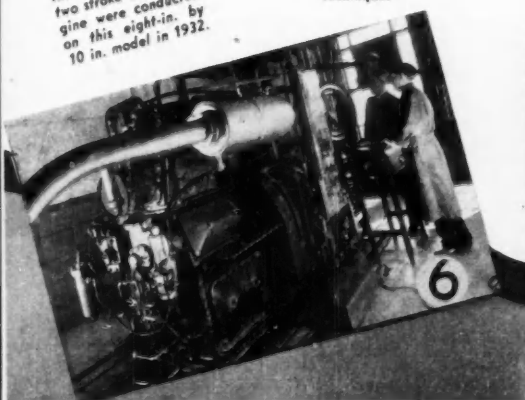


(9) Semi-pilot plant for producing triptane which was in operation between October, 1942, and January, 1943. Equipment shown is: left, dehydrator; center, high pressure reactor; right back-ground, still; and right foreground, autoclave.

(7) Development and control of shot peening by GM in 1938 contributed substantially to the advancement of this technique.

(8) The Sonigage, an ultrasonic device for measuring metal thickness when the part is accessible from only one side and for detecting flaws in finished coatings, was under development of GMR in 1942.

(6) First studies of the present uni-flow two stroke Diesel engine were conducted on this eight-in. by 10 in. model in 1932.



Publications

AVAILABLE

New Industrial Literature listed in this department is obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

L-119 Cab Heaters

Young Radiator Co.—Bulletin Form 1950 describes the construction, dimensions, and capacities of a compact unit heater weighing 57 lb that is capable of delivering sufficient heat for locomotive cabs, small buildings and similar small areas.

L-120 Oil Maintenance

Sun Oil Co.—Facts on oil maintenance, instructions for cleaning systems, tips on oil-testing and draining are presented in an 18-page booklet. It includes complete trouble-shooting charts.

L-121 Milling Cutters

Cincinnati Milling and Grinding Machines, Inc.—A new issue of booklet M-1714, "Recommendations for Sharpening Carbide Milling Cutters," has just been made available. This 16-page

booklet has been completely revised to incorporate the latest data.

L-122 Speed Reducers

Michigan Tool Co.—Just released is a new four-page engineering bulletin 789-50, that gives basic general information on standard Cone-Drive speed reducers and gear sets ranging between five to one and 70 to one ratio, and from 0.05 up to 555 hp capacity.

L-123 Welding

Linde Air Products Co.—A newly revised 28-page booklet F-6190, contains information on welding, surfacing, and hard-facing of many commercially used metals. Chapters are included on the fundamentals of the process, a description of Heliarc equipment, preparation for welding, operating instructions for handling the torches, and complete welding data for most metals.

L-124 Powered Hand Trucks

Clark Equipment Co.—New powered hand trucks are described in detail in a 12-page, two-color booklet. Separate sections of the book are devoted to each of the two power types; the Electro-Lift, battery-powered and motor driven; and the Hydro-Lift, gas-powered and driven by hydraulic pump and hydraulic motor.

L-125 Switches, Disconnecting

Westinghouse Electric Corp.—The complete line of indoor and outdoor air-disconnecting switches is described in a new eight-page booklet, B-4726, recently released. Highlights on the design and operation of these switches, as well as application information to simplify selection, and references to more detailed literature are included.

L-126 Grinding

Norton Co.—Foundry grinding practices and various equipment are described and illustrated in Vol. 41, Number 10 of the firm's monthly publication, "Grits and Grinds." Besides the foundry article, there is a question and answer section dealing with the properties of abrasives.

L-127 Turbosupercharger

General Electric Co.—Bulletin GEA-5537 discusses the company's new CH9 turbosupercharger for high-powered (Turn to page 94, please)

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Cost Reducing Methods

Discussed by Body Engineers

During the three-day meeting of the American Society of Body Engineers in Detroit last month, special emphasis was placed on materials and processes for reducing costs. Presented here are abstracts of two of the papers devoted to saving material and time.

Hot-Spray Method of Finishing Passenger Car Bodies

By J. B. Wiesel
Hercules Powder Co.

ONE of the principal drawbacks to the use of lacquer for painting automobiles has been the limited solids applied per coat, as compared to those deposited per coat of synthetic enamels. An early approach to, and solution of this problem was made some years ago by building up the solids content by specific formulation. And, during the past ten years, the solids content of the average lacquer has been increased rather markedly. Some manufacturers actually advertise 35 per cent high-solids clear lacquer for specific purposes, and most cold lacquers will vary from 20 to 30 per cent solids at the gun.

The hot-spray process of spraying lacquer, however, takes the idea of increased solids one step further. In this process, reduction to spraying viscosity is achieved by heating the lacquer to approximately 160 F, instead of depending entirely on the use of thinners. Safety precautions are the same as for cold spray lacquer. Basically, there is no difference in the quality of finish, or in composition of solids, between hot-sprayed and cold-sprayed lacquers. The solvents are different since fast evaporating solvents are almost eliminated, the solids applied are higher, and the number of coats is correspondingly lower.

Today, it's time to take a new look at lacquer because this process brings the cost of applying it into approximately the same range as applying synthetic enamels, and thus makes many of the advantages of lacquer available with greater economy than heretofore.

It is realized that the application of lacquer by the hot-spray process was tried in the finishing of automobile bodies some years ago with not very satisfac-

tory results. The difficulties encountered during those days were caused primarily by the inefficient heating equipment available and possibly the reluctance of the spray men in those days to develop proper spraying technique.

During the past several years much development has taken place with the various producers of hot spray equipment, so that today at least seven manufacturers are producing suitable hot spray units.

Plastic Die Models

By Raymond L. Logue
Production Engineer
Kaiser-Frazer Corp.

THE first phase of the plastic model program on Kaiser-Frazer's Henry J started after experimental body design had been completed and the final clay model had been approved by management. Panel outlines and openings, as well as 10 in. lines, were established on the clay, and all master lines, by the use of templates and height gages, were transferred to a master lines draft. At this point, female plasters for each individual panel were made from the clay. Cardboard or pressed wood strips were built up just beyond joint and opening lines and a supporting frame was constructed and placed adjacent to the area of the clay from which the first plaster was to be taken. A putty coat of plaster was first applied to the clay to avoid the heat or weight damage that would result from a greater mass of plaster being applied. When the putty coat was rigid enough, reinforcing steel, hemp and plaster were used to build up the wall thickness to approximately 1½ in. and bond the plaster form into the nail studded frame that was placed adjacent to the clay model. When the female plasters were removed, the cast surface carried a duplication

(Turn to page 84, please)



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NEW EQUIPMENT



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M-65—Rapid-Action Gear Tester

A rapid-acting Red Ring gear tester put out by the National Broach & Machine Co., Detroit, Mich., is being used by one of the large automotive gear manufacturers to test automatic transmission low planet pinions for nicks. It does this by running them in mesh with a master gear. A power spindle, on which is mounted the master gear, drives the work pinion which is merely



Red Ring rapid-action gear tester manufactured by National Broach Co.

slipped onto its spindle in the rocking workhead, thereby requiring no retaining work fastener.

The workhead rocks about a central fulcrum with a compression spring normally holding it at an elevation which allows the pinion and master gear to be in very loose mesh. This enables the work pinion to be slipped on and off readily. In this position, a safety electrical interlock prevents the power from being turned on.

With the work pinion on its spindle and in loose mesh with the master gear, the rocking handle is pulled forward to bring the two gears in close mesh or to a predetermined center distance and, at the same time, to release the interlock. Then, by pressing the "start" button at the right of the machine, the test begins.

As soon as the rocking handle is al-

lowed to return to its initial position, power is cut off and a solenoid operated brake goes into action to stop rotation of both gear and pinion for unloading and reloading the next work piece.

Although gears are thus tested very rapidly, the operator is declared fully protected. First, both hands are occupied with machine controls while the power is on. Second, immediate brake action occurs as soon as power is cut off.

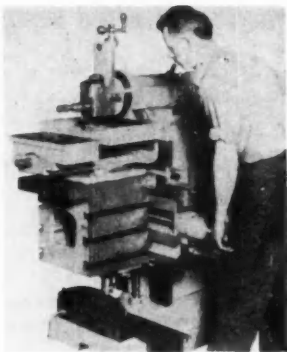
M-66—Follower Type Shaper

A low cost follower type shaper for duplicating contours on metal parts, a product of Cincinnati Shaper Co., Cincinnati, Ohio, is used for automatically shaping contours on dies, clamps, cams and other parts without laying out the contour on the work and shaping to a line as is normally done.

The follower equipment can be supplied on any stroke or size of Cincinnati shaper. The shaper is a standard machine except for the pad on the base, the masterform holder and a special table support post. It can be used

for regular shaper work as well as automatic duplicating. Changeover is simple and quick.

The rail elevating screw is discon-



Cincinnati Shaper Co.'s follower type shaper.

nected and retracted when duplicating, so table and rail are free to move vertically. Rail and table are supported on

M-67—Automatic Tube Bender



Up to 1,000 bends per hr of 1-in. 16 gage steel tubing are now declared possible on the new, improved "Bend-Ex" Model A bender placed on the market by the Paul Machine Tool & Die Works, Chicago, Ill. A fully automatic die-and clamping-head which grips and bends tube automatically has doubled the machine's production, while operation has been simplified to three quick steps. The bender is adaptable to all bending—round, square, and rectangular tubing—pipe, light angles, channels, solid bars, etc., operated with air compression. As high as 10 bends are possible on a single tube. Interchangeable dies are available for different size tubing diameters and radii.

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the masterform by the steel support post equipped with a roller. The masterform to be duplicated is made of ½ in. steel and clamped in the holder that is secured to the pad on the base. The table progresses horizontally by automatic feed. Table, rail, and work follow the vertical and horizontal movement of the roller as it travels over the masterform.

A die is machined by feeding the tool slide down in consecutive cuts to rough out the die and with a final finish cut to complete the surface. The limiting angle of climb is approximately 20 deg.

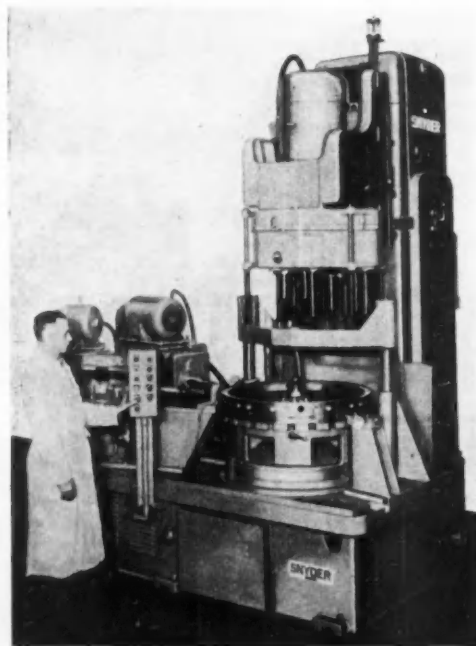
M-68—Horizontal and Vertical Drill Press

A special purpose machine for drilling and chamfering a 36 in. steel ring 3¼ in. thick, but adaptable to other similar operations, is a product of Snyder Tool & Engineering Co., Detroit, Mich.

The machine has a capacity of 1.6 pcs an hr at 80 per cent efficiency, and is equipped with control mechanism

which provides for alternating the depths of the 36 holes drilled and chamfered around the circumference of the work piece. The vertical head also drills three groups of holes in the top of the part. This head is cycled automatically when the workpiece is located in the proper radial position. Indexing is automatic by means of a 34 in. diam table with Geneva index. Clamping is manual but the work cycle is automatic thereafter, and the machine may be operated by semi-skilled help.

Tools are 1 5/16 in. high speed steel, working at 116 rpm with infeed of 0.016 per revolution. They are mounted in a Snyder standard quill unit and are changed manually. The vertical, 11-spindle head is powered by a 20 hp motor. Stroke is 16 in. The work cycle is—load, rapid advance, drill, chamfer, rapid return, index, and repeat until all radial holes are drilled. Fixture is mounted on a Snyder standard self-contained horizontal slide unit moving on hardened and ground ways, and powered by a 5 hp motor. All moving parts are safeguarded and emergency



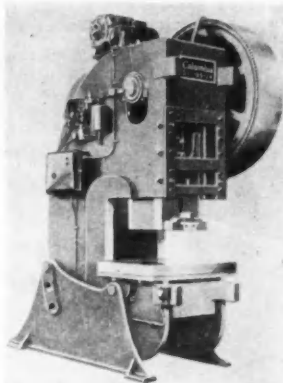
Snyder special horizontal and vertical drill press

stop buttons provided. Coolant supply is from a 67-gal separate tank, mounted on the rear of the machine, and is circulated by a ½ hp motor. Column is cast iron mounted on a welded steel base, thoroughly braced and normalized.

All gears are shaved for smooth operation. Lubrication is automatic. Necessary floor space is 83 in. by 103 in.

M-69—Open Back Inclinable Press

Columbia Machinery and Engineering Corp., Hamilton, Ohio, has developed a complete line of single-crank open



Columbia single-crank open back inclinable press.

back inclinable and gap presses now offered with its line of power press brakes and steel squaring shears. Designed for stamping, drawing, blanking, coining and embossing, the new Columbia line includes O.B.I. presses in sizes from 10 to 200 tons capacity, both inclusive, and gap presses in capacities from 60 to 200 tons. Two basic designs have been developed—one for presses up to 45 tons capacity, and another for more rugged, heavier, larger units.

The smaller presses provide a cone-type clutch located on the crankshaft, said to be lighter and more compact than friction-disk clutches formerly employed. Flywheel effect is reduced, with a corresponding reduction in starting current consumption, heat generation, and wear on the clutch and brake linings. Location of the clutch on the crankshaft allows the flywheel to be placed outside the housing, permits use of a smaller bull gear, and gives more room for die set-up and operation. With this construction, a different group of gear teeth engages at each stroke, eliminating excessive wear on a few teeth.

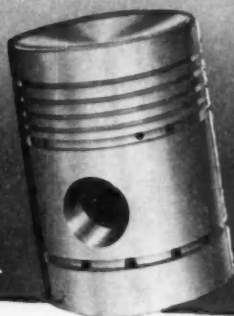
Both O.B.I. and gap presses in larger sizes use a new Alcone aluminum cone-



Air Craft



Nelson
Auto-Thermic



Diesel



Trans Slot



Wing Insert



Two Cycle



Steel Truss



Turbulator head



T-Slot



Trunk Type

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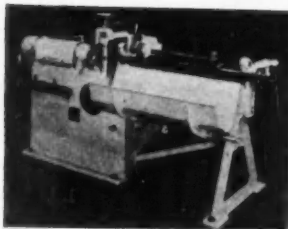


For additional information regarding any of these items, please use coupon on page 52

type clutch, developed by Columbia engineers for press drive. The new Alcone clutch greatly reduces size and weight with a correspondingly large reduction in flywheel effect. The 12 deg cone is actuated by one-fifth the cylinder area required for friction disk clutch operation, permitting use of a smaller, lighter cylinder. Alcone design is also said to permit the adjustment to compensate for wear to be incorporated in parts which do not have to be started and stopped. These features serve to further reduce the flywheel effect, permitting faster starting and stopping, with more press cycles per minute. The aluminum parts quickly dissipate heat and, since the clutch and brake linings are fastened to inner members, heat generated in starting and stopping is thrown outward and more quickly dissipated. As a result, it is claimed that wear on engaging surfaces is greatly reduced and adjustments and maintenance are required only at long intervals.

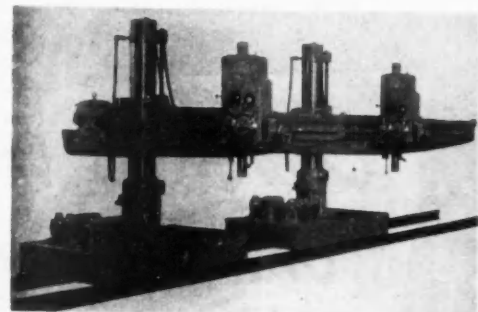
Inclinable presses may be inclined to a maximum of 25 deg from vertical. All models are V-belt driven with motor mount, motor sheave and V-belts standard equipment.

M-70—Wire Straightening Machine



American Pullmax wire straightening machine, TKM-6.

A wire straightening machine, the TKM-6, product of the American Pullmax Co., Inc., Chicago, Ill., operates on the rotary principle and has a capacity for wire from 3/32 in. up to 9/32 in. in diam. The TKM-6 is entirely automatic, taking wire from a reel into the rotating straightening dies. These dies subject the wire to repeated rotary bending which removes internal stresses. The wire is fed by a pair of transport rollers onto a guide bar where it makes contact with a stop that



Cincinnati Gilbert track-mounted radial drill.

actuates the cutting mechanism. At moment of cutting, feed motion is disconnected so the transport rollers will not slide against the stationary wire.

Rate of feed varies from 56 ft to 181 ft per min. The machine straightens and cuts wire in lengths up to 19 ft 6 in. Available receiving tray capacities start at 3 ft 3 in. and increase in multiples of 3 ft 3 in. up to the maximum length.

M-71—Tube Bending Hydraulic Press

Designed and tooled for tube bending operations, a new hydraulic press announced by the Gibbons Machine Co., Tipp City, Ohio, provides an operating speed of 20 strokes per minute.

A new multiple positive index stop for various degree bends makes certain the operator will have no unpredictable over-run, such as is usually experienced

when relying on reversing a four-way hydraulic valve to control the depth of stroke. The knee width of this new press is only 11 in., which permits reverse bends 5 1/2 in. apart. Rocker die and three sets of rockers and side arms are furnished with hydraulic pressure pad. Also provided is the overhanging type ram which operates in nickel cast

iron gibs and permits bending over the top of the punch. With this construction, all operational strains are taken off the cylinder packings and rings, the company points out.

Known as Series 200, the press has been made a part of the regular line of Gibbons standard, straightening, four-column, and forcing presses.

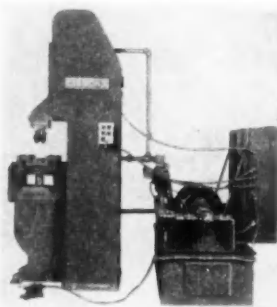
M-72—Track-Mounted Radial Drill

Improved flexibility is offered in the new track-mounted radial drill placed on the market by the Cincinnati Gilbert Machine Tool Co., Cincinnati, Ohio. The base, 46 in. wide by 90 in. long, rides on standard Cincinnati Gilbert horizontal boring mill runways or 100 lb rails. Gage is 3 ft. The unit carries, completely enclosed, all necessary power and electrical equipment. Traversing, clamping and coolant pump controls are mounted on the base and duplicated on the drill head for operator convenience.

Power traversing and clamping equipment is optional. Under power the unit traverses at a rate of 50 fpm. Traversing mechanism consists of a 1 1/2 hp 960 rpm motor adaptable to AC or DC sources, a reversing control, worm-driven speed reducer, and heavy bevel gears for the final drive to one axle. Both axles rotate in Timken tapered roller bearings, and all mechanism operates in oil or is permanently lubricated.

The clamps, located near each wheel, hold the drill during operation. The clamping motor is equipped with a reversing starter. Coolant pump, mounted on the machined base, has its own motor and starter.

(See above illustration of this machine)



Gibbons tube bending press, Series 200.



Above: Counterboring a hole in a cast iron machine base. Uniformity of chips indicates free-cutting action; chip disposal is aided by wide flutes. And when the operation is finished the cutter is removed from the holder with a simple twist of the wrist.

**HAND
DETACHABLE
EVEN AFTER THE
TOUGHEST
CUTS**

**CONTINENTAL
STANDARD DRIVE
COUNTERBORES**



There's no wedging action in Continental Standard Drive Counterbores. Cutters are removable from the holder with a simple twist of the wrist, even after the toughest cuts. Double driving lugs on the cutters engage double abutments in the holders to give a balanced,

positive drive that practically is indestructible. Double bearing areas in the drive assure rigidity and proper alignment of cutters and holders. Continental Counterbores are available individually or in sets that include holders, cutters, countersinks and pilots in practical size ranges.



The new Continental Catalog lists various counterbore holders and cutters (in high speed steel and carbide tipped). For your free copy, write on your company letterhead. Please ask for Catalog No. 60681.

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Division of Ex-Cell-O Corporation

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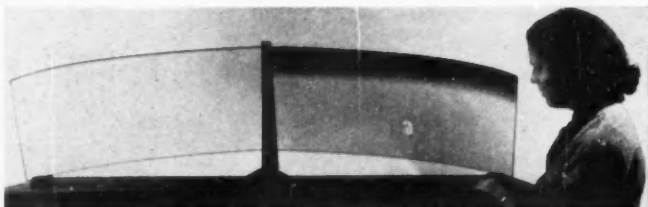
FOR ADDITIONAL INFORMATION regarding any of these items, please use coupon on PAGE 52

P-106—New Shaded Car Windshield

A new automobile windshield, scientifically developed by Libbey-Owens-Ford Glass Co., Toledo, Ohio, to reduce road glare and heat in the car, consists of slightly tinted bluish-green safety plate glass with graduated shading above the eye level. Designated as the E-Z-Eye shaded windshield, it has passed light-transmission requirements of the American Standards Association with a good margin to spare, according to Libbey-Owens-Ford.

Created to eliminate unsightly and cumbersome inside or outside sun visors, this shaded windshield is being offered as optional equipment, along with E-Z-Eye safety plate side lights and rear windows, in the Roadmaster and Super series of Buick automobiles. With this all-around type of installation both glare and heat from the outside are reduced on all sides of the car, driver and passenger comfort is increased, and car upholstery is less subject to fading.

The slightly bluish-tint in the glass itself is obtained by mixing iron oxides in the glass during manufacture. By balancing the ingredients properly, it is declared possible to eliminate about one-third of the sun's glare-producing rays and one-half of the heat rays and still preserve the optical qualities of



New Libbey-Owens-Ford E-Z-Eye Shaded Windshield (right) contrasted with conventional type of windshield (left).

the glass. A secret process is used to produce the modulated shading of the plastic in the upper part of the windshield so it excludes unwanted infra red and ultra violet rays.

of the hob or cutter itself. Hob sharpening departments can now measure the exact amount of error in sharpening—guesswork and waste set-up time being eliminated.

P-108—Hob Sharpening Checker

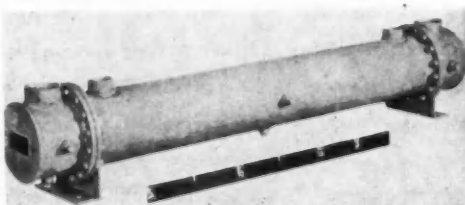
Barber-Colman Co., Rockford, Ill., comes forward with a new hob sharpening checker for measuring inaccuracies in hobs or formed cutters due to face sharpening. This precision instrument inspects radialism, flute-to-flute spacing, total spacing, face offset and accuracy of straight flutes with the axis of hobs and cutters. It may also be used for checking runout of faces and OD's of hubs as well as the OD runout



Barber-Colman hob sharpening checker

P-107—Shell and Tube Bundle Heat Exchangers

Specially designed "A-800" shell and tube bundle heat exchangers developed by the Young Radiator Co. of Racine, Wis. and Mattoon, Ill., for air cooling in Diesel locomotive,



Diesel engine, gasoline engine, and similar applications, are standardized in manufacture for prompt delivery and minimum cost. Engineered for high cooling capacity within a light-weight, compact shell, the units are suited for use with engine jacket water as the coolant, maintaining a balanced temperature between oil and water

when required. Young-designed bonnets provide smooth inlet and outlet flow with minimum impact on headers and are removable for cleaning. Tubes are secured into the headers to prevent leakage from vibration and temperature changes. Illustrated, is Young Standard locomotive oil cooler, Model A-806, having fixed tube bundle for compactness and light weight.

This new hob sharpening checker is designed to utilize the standard index plates of the Barber-Colman No. 10-12 hob sharpening machine. These plates are 9½ in. in diam and index is held to ± 0.0005 in. adjacent, and ± 0.0015 in. total error. Special precision plates are available with adjacent spacing error of only ± 0.00025 in. and non-adjacent error of ± 0.001 in. Because of the larger diam of these index plates all error at standard hob diameters is eliminated for inspection purposes.

Checking is done by means of an indicator mounted on a surface plate. The indicator finger is set on the exact centerline by means of a gage block mounted on the index head. For checking negative and positive rake angles, there is a micrometer built into the head so that the indicator may be set off center. An alignment bar on the surface

*Multiply
Production*

*Subtract
Man-Hours*

*Add
Profit*

with **BUNELL** Jigs and Fixtures



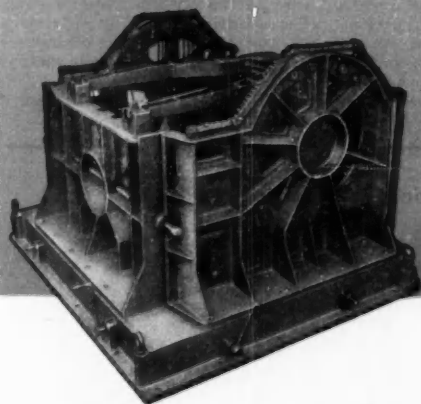
AUTOMOBILE FRAME CHECKING FIXTURE. Checks frame and drills two final holes. Can be adapted for straightening.

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Our specialized experience and know-how are at your service. Consultation with our engineers on your problem is invited. Write today for full information.



DRILLING FIXTURE. This unusual fixture supplies coolant under pressure to the cutting tool near the bushing.



PRECISION INDEX MILLING FIXTURE. Mill lamination for variable speed chain drives to extremely close tolerances. Indexes within a fraction of a second of a degree.

WRITE FOR CATALOG

which shows a wide variety of Bunell Jigs and Fixtures.



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plate guides the indicator stand so that it may be moved at right angles to the axis of the hob when checking the faces of helical gash tools. Toggle-type mechanisms are utilized for both the index plate pawl retractor and the tail stock center lever.

P-109—Contact Gaging Plug

Placed on the market by Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford Conn., a newly designed contact gaging plug for P & W Air-O-Limit internal comparators



Pratt & Whitney contact gaging plug.

permits air gaging of rough-surfaced bores with a high degree of accuracy declared previously not obtainable.

In the new design, the rate of air flowing through the gaging plug is controlled by carbide buttons mounted on spring leaves. The buttons are depressed by contact with the work during gaging, and impede the escape of air from small nozzles within the plug. The resultant change in line pressure causes the Air-O-Limit indicator to show the exact variation from basic diameter in decimal terms.

The contact plug is especially suited for diamond boring and reaming operations where finishes exceed 50 micro-inches—a degree of roughness which prevents use of conventional air gaging plugs. Conventional plugs, the company explains, jet the air directly against the surface of the bore, and pressure is regulated only by the rate at which air escapes through the clearance between bore and plug. In this type of gaging a relatively smooth bore is prerequisite to accurate readings, it is pointed out.

P & W contact gaging plugs can be furnished with either an easy-entry "bullet" nose or a pilot nose which pro-

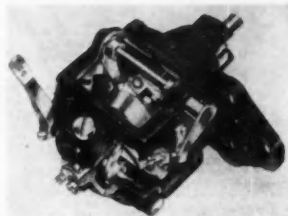
vides for fast and accurate operation. A design feature permits adjustment for setup and wear of the carbide contact gaging buttons. For further wear resistance, the plugs may be obtained with chromium plating or with carbide wear strips.

P-110—Centrifugal Governor

A variable speed centrifugal governor for industrial engines of all types, announced by Hoof Products Co., Chicago, Ill., is designed to provide accurate control, yet cover a broad operating range, with exceedingly close regulation regardless of load conditions. The spring system has a wide adjustment latitude, eliminating necessity of using exact pulley size to insure accurate performance.

Made primarily for belt drive, this mechanical governor can be adapted for gear drive and may be supplied with or without a speed control lever operated from the dash. Ball bearing throttle boxes are supplied where necessary.

Ball, roller and needle bearings, used throughout at all load and friction points, provide smooth free-running operation, insure sensitive control and provide long life. All thrust surfaces are hardened and ground, and a light weight throttle actuating lever gives



Hoof variable speed centrifugal governor.

freedom from surging.

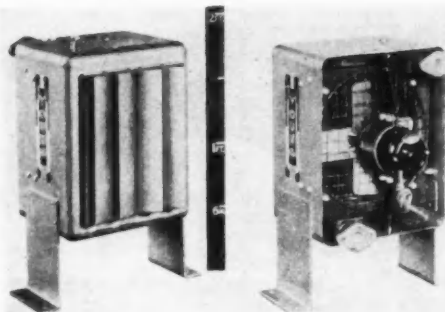
Daily oiling is declared unnecessary. A housing completely encloses the mechanism. All shafts have oil seals.

P-111—Chrome Plated Piston Rings

To be shown at the Automotive Service Industries Show at Navy Pier, Chicago, Illinois, December 4 through 8, is a completely new piston ring set offered by the Perfect Circle Corp. of Hagerstown, Ind. Designated as 2-in-1, this new piston ring set features for the first time in any piston ring line two chrome plated rings per piston, top compression as well as the oil ring, and in addition to normal springs, an optional set of HiPressure springs packed with the oil rings for use in badly worn engines. In the 2-in-1 set the superior bearing and wear characteristics of chrome are available for general installation in all passenger car, truck, bus and tractor engines, it is stated. According to the company, the 2-in-1 set raises the overall standards of piston ring performance by providing positive oil control and twice the life of sets generally accepted as satisfactory.

The inclusion of two complete sets of

P-112—Unit Heater for Small Areas



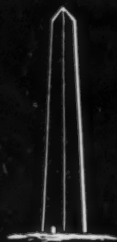
Compact unit heater (16 in. by 13 in. by 17 in.) weighing 57 lbs and manufactured by the Young Radiator Co. of Racine, Wis., delivers sufficient heat for locomotive cabs, small buildings and similar small areas and is also recommended for delivering auxiliary heat in out-of-the-way places. For rugged service, only seamless tubes and high temperature brazing alloys are used. Mounting brackets can be furnished for mounting in any position, adding greatly to ease of installation. The heater may

be used with either steam or hot water and is recommended for using waste heat from the heated jacket water of gas, gasoline, or Diesel engines.



Simple in design

Simple in operation

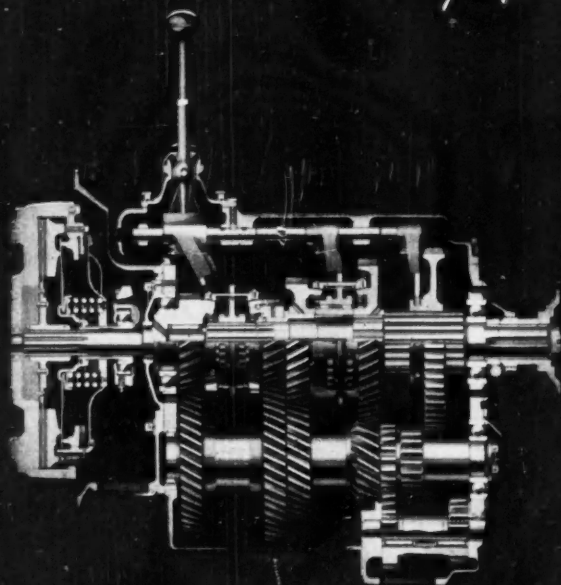


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all driving conditions*



Spicer

Fully Synchronized Transmission



Moving more tons at less cost per mile, with increased driver comfort and efficiency, are important functions being rendered daily in thousands of Spicer *Fully Synchronized Transmission* applications. Its advantages include:

Fully Synchronized in All Speeds but "First"
Faster Shifts No Missed Shifts
Fast Getaway No Lugging of Engine

Less Vehicle Slowdown When Shifting
Shifts Made Without Slowdown
for Double-Clutching

Shifting Lever Travels Same Distance Every Shift
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NEW PRODUCTS

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optional pressure springs in each 2-in-1 package is said to be an innovation in piston ring equipment. Easily identified by plain ends, the Normal Pressure springs are recommended for installa-

tion in rebored or slightly worn cylinders or where maximum gasoline economy and minimum drag is essential. The HiPressure springs, with notched ends, are recommended for installation

*the P.A. from So. Carolina
said to the
P.A. from No. Carolina*

**"If you are looking for the
best source of precision
gears—send the prints to
IGW at Indianapolis, you all."**



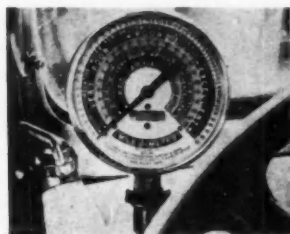
Transmission bevel gear for
Sikorsky S55-Helicopter

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PRECISE MACHINE PARTS
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in badly worn engines or known oil pumpers. Although definite installation recommendations are made, it is claimed that with the protection of chrome on the steel rails of the oil ring, mechanics can satisfy their own preferences in the selection of spring pressure without risking scuffing or scoring.

P-113—Dashboard Gage Tells Miles-Per-Gallon

A Mile-O-Meter dashboard instrument gage claimed perfected by Gale Hall Engineering, Inc., Boston, Mass., is said to indicate miles per gallon of gas being consumed at all normal cruising speeds, to indicate when valves are sticking, when carburetor is out of adjustment, when timing is wrong,



Gale Hall Mile-O-Meter dashboard gage
for indicating relative miles per gallon fuel
consumption.

when muffler is becoming plugged, and generally to indicate best position of foot throttle to gain most economy under all conditions and under all loads.

Manufacturers of tune-up instrument, Gale Hall Engineering found during experimentation that throttle opening between carburetor and intake manifold had a definite bearing and could be calibrated on a scale of an intake manifold pressure gage to indicate the miles per gallon in a relative and in most cases almost a positive reading.

The meter is easily mounted on any automobile with a bracket that can be bent in any position. A hose runs to the intake manifold.

The company states that the AAA has certified approval of the claims that the meter gives relative miles per gallon, checks the engine difficulty or condition, and serves as an aid in achieving the greatest economy in motor performance.

P-114—Plastic Covering For Hard Surfaces

A vinyl plastic Naugahyde covering for use as a facing for hard surfaces in busses, airplanes, boats and trains is now being produced by the United States Rubber Co., New York, N. Y.

The vinyl covering has a tough
(Turn to page 67, please)

A black and white photograph of a GE motor. A spider web is draped over the top right portion of the motor, symbolizing long-term reliability. The GE logo is visible on the motor's frame.

TRI CLAD MOTORS

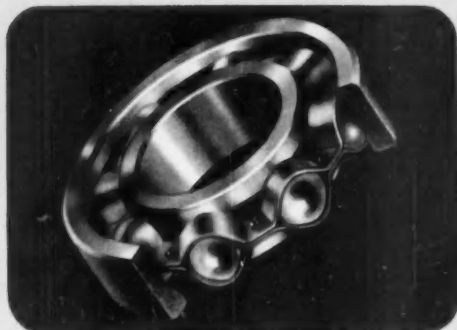
REG. U.S. PAT. OFF.

will run safely without relubrication for as long as any general-purpose motor you can buy—

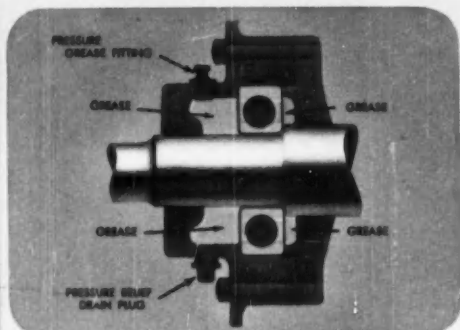
and if the application makes relubrication a must, you can grease a **TRI CLAD** without halting production

GENERAL  ELECTRIC

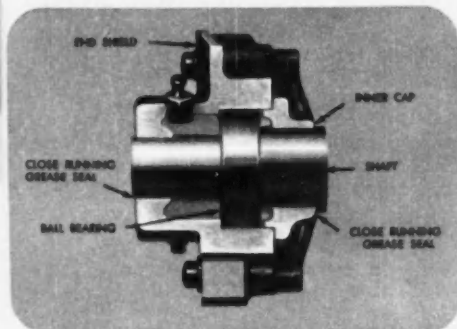
HERE'S
WHY



- 1 **EXTRA BEARING PROTECTION** — Tri-Clad gives you extra bearing protection because heaviest standard-service bearings are carefully selected to withstand severe loads for long periods.



- 2 **EXTRA GREASE** — Four times the ordinary amount of grease is packed into the large Tri-Clad grease reservoir. Since bearing life depends on grease, this means that Tri-Clad motors will run safely for years — for as long as any general-purpose motor you can buy.



- 3 **SEALED-IN BEARINGS** — Bearings and grease are completely sealed in a cast housing with long running seals for extra protection from dirt, dust, and lubricant leakage.

TRI-CLAD MOTORS will run safely without relubrication for as long as any general-purpose motor you can buy—

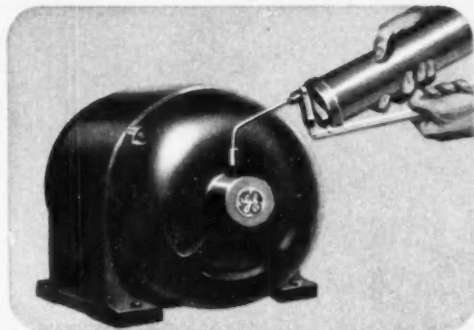
Tri-Clad extra lubrication "protection" can save you money because:

1. Tri-Clad's oversize grease reservoir and the heaviest standard-service bearings mean you do not have to bother with greasing between motor check-ups.

2. When relubrication is needed on those tough applications, you can grease a Tri-Clad without interrupting production-line operations.

Tri-Clads are grease-gun easy to lubricate on the job. Moreover, a Tri-Clad motor will run safely where an ordinary motor would fail. Chances are you'll be spared the cost of a "special" motor.

YOU BE THE JUDGE! The best way to prove to yourself that Tri-Clad gives you the most for your motor dollar is to contact your local G-E office. Tri-Clad stocks are complete. Apparatus Dept., General Electric Company, Schenectady 5, N. Y.



- 4 **PRESSURE-RELIEF GREASING** — An efficient system of pressure-relief lubrication (with standard fittings) enables a Tri-Clad motor to be quickly and easily greased on the job when and if it's needed.

GENERAL  ELECTRIC

NEW PRODUCTS

(Continued from page 64)

special backing which gives it stability in hanging. It can be applied with conventional adhesives on most hard surfaces. It has a smooth, fine textured grain and is highly resistant to abrasion, scuffing and gouging. It will not become brittle or chip, retains its color and texture, and can be washed with soap and water.

Naugahyde plastic covering finds use in head lining, side wall panels and luggage rack covering in bus manufacturing. The product is made at the company's Mishawaka, Ind., plant in 30-yd rolls, 50 in. wide. It is being sold in 12 colors, including seven pastel shades and five deep tones. Special grains and colors available.

P-115—Small Hand Power Tools

Small hand power tools announced by Chicago Wheel & Mfg. Co., Chicago, Ill., consist of a new "Handee '85'" tool and companion complete - with - accessories kit, the "Handee Workshop." The tool unit proper, the "Handee '85'," is said to be suited for industrial produc-



Chicago Wheel & Mfg. Co. small hand power tool, "Handee '85'".

tion lines as well as for fine handi-crafting.

Balanced and shaped to fit the hand, the "Handee '85'" has an idling speed of 27,000 rpm and a load speed of 20,000 rpm. It weighs two lbs and chucks interchangeable spring collets of 1/16 in., 3/32 in., and 1/8 in. capacity. The new chuck construction is said to assure smooth running action with a quick, firm grip on all accessories. The tools

cooling arrangement permits running all day long without excessive heating up. A steady stream of air weaves and swirls automatically around the motor, keeping its housing comfortably cool to the hand. A feature of the "Handee '85'" is a cast-in boss, just behind the chuck, which holds easily-attached rout-

For additional information please use coupon on page 52

ing and molding shoes. Twenty different molding cuts can be made.

Work in wood, metals, plastics, and other materials is within the scope of the tool, in such diverse operations as grinding, drilling, polishing, sawing, cutting, sanding, and engraving.

Although some 200 different accessories are available for use with the "Handee '85,'" the firm has assembled 41 matched attachments together with the tool in a combination called the "Handee Workshop."

(Turn to page 88, please)

... For smooth engines
CHICAGO TAPPETS



... For rugged engines
CHICAGO SPECIAL AND STANDARD PARTS



Mechanical Tappets
Hydraulic Tappets
Oil Pump to Distributor Shafts
Rocker Arm Shafts
Water Pump Shafts
Flywheel to Crankshaft Screws
Adjusting Screws
Cylinder Head Cap Screws
Main Bearing Cap Screws
Differential Carrier Screws

Cylinder Head Studs
Main Bearing Studs
Wheel Bolts and Studs
Push Rods
Retainers
Connecting Rod Bolts
Automatic Transmission Valves
Hydraulic Cylinder Pistons
Diesel Energy Cells
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Special Screw Machine Parts 1/16" to 5" Diameter, Plain or hardened and ground • Cap Screws • Set Screws • Nuts • Studs • Taper Pins • Socket Screw Products •

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SCREW COMPANY**
2801 WASHINGTON BLVD.
BELLWOOD, ILL.
Established 1872

Comparative Weight and Splitting Resistance of Standard Mechanical Roll Felts and Sheet Felts

Classification ⁽¹⁾	S. A. E. Specification No.	Trade Designation	Standard Thickness Range (in.)	Weight ⁽²⁾ Equivalent 1 in. Nominal Thickness	Splitting Resistance ⁽³⁾ Lb. per 2 in. Width (Minimum)
32S		Extra hard	$\frac{1}{4}$ to $1\frac{1}{2}$	32.00	50
26S		Hard	$\frac{1}{4}$ to 3	26.00	46
20S		Medium	$\frac{1}{4}$ to 3	20.00	44
18R		Laundry	$\frac{1}{4}$ to $1\frac{1}{2}$	18.00	35
16R	F-1	Back check	$\frac{1}{4}$ to 1	16.00	33
16S		Soft	$\frac{1}{4}$ to 3	16.00	32
12S		Extra soft	$\frac{1}{4}$ to 3	12.00	18
12R	F-5	Extra firm pad	$\frac{1}{4}$ to 1	12.24	18
9R	F-10	Firm pad	$\frac{1}{4}$ to 1	8.48	8

Notes: (1) The letter "S" denotes sheet felt, which is fabricated in 36 in. square sheets; the letter "R" denotes roll felt, which is fabricated in lengths of 15 to 30 yards, 60 and/or 72 in. wide. (2) Weight connotes density. (3) Splitting resistance affords the standard test measurement for determining the integration of felt; it reflects the staple length, character and uniformity of the raw wool stock and also the relative amount of felting effected in manufacture.

New Mechanical Felt Standards

ENGINEERING material specifications covering mechanical sheet felts have been adopted by the felt association, representing manufacturers of wool felt, following a five-year development program of the association's standardization committee. This step extends the range of specified mechanical felts upward from the standard roll felt specifications to include felts of similar construction which are fabricated in 36-in. square sheets in order to produce materials up to twice the density and three times the thickness available in roll felts.

Sheet felts are characterized by precision in manufacture, resulting in marked dimensional stability and improved physical properties which qualify them for numerous technical applications not covered by types of lower density. Their special characteristics are due to the method of fabrication, whereby alternate piles of carded wool are laid at right angles to form the batt from which the sheet is felted, thus providing equal strength in both directions and also producing a more uniform integration of the fibers in the thickness dimension.

The sheets are "felled" in the characteristic manner of working felt, to a considerably greater extent than roll felts. Extended processing produces a closer consolidation of the fibers, effecting the higher degree of density noted. In consequence, the higher density felts may be drilled, turned, molded and otherwise formed and finished in somewhat the same manner as wood and with the common woodworking tools and machines. The distinctive texture achieved also affords wide latitude in the production of sheet felt parts by the more familiar methods of shaping roll felt, such as die cutting, punching, shearing and skiving.

Formulation of the sheet felt standard involved thorough consideration of the various uses to which sheet felts already have been applied, and the specifications were drawn in view of the growing demand to provide all manufacturing industries with specification materials for better performance and longer life. Improved quality control was a considered part of the program, as was also the aim to facilitate procurement through standardization in times of national emergency. Tolerances were established to aid in the conception of practical engineering design, while manufacturing limits were held to good commercial practice.

The manner in which time the standard sheet felts supplement the range (Turn to page 70, please)

Sure sign of value...

Exclusive features protected by U.S. patent Nos. 1958725, 2140818 and 2230471



IN ITS 16th
YEAR OF FAITHFUL
SERVICE TO
MOTORDOM

Aetna T-type clutch release bearings have been the choice of value-wise car, truck, bus and tractor manufacturers since 1934.

And there are good reasons why: Once installed they are trouble-free, attention-free for vehicle life. Thanks to their patented design and self-lubricating features there's no need of costly machining operations for oil lines or grease fittings—no need of further maintenance whatsoever. Think what that means in increased assembling efficiency and lower assembly costs, in cementing the vehicle owner's good will.

It's a trusty sign of dependability and economical performance in any vehicle—the famous Aetna T-type bearing. Investigate. Find out the many other sound reasons why Aetnas deserve a place in your specifications.

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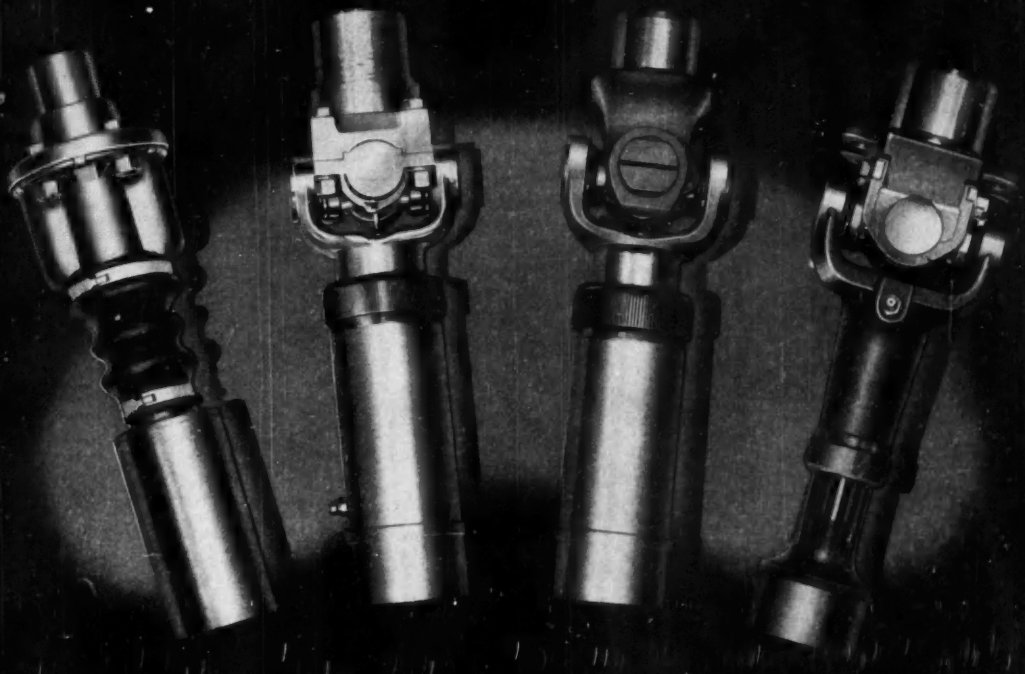
In Detroit: SAM T. KELLER, 2457 Woodward Avenue

Aetna

T-TYPE Clutch Release BEARINGS

WITH THE... THAT TAMES TROUBLE

The Most Neglected Part of a Car
is the Universal Joint . . .



. . . It Must Be Built to Stand Abuse

Most motorists expect certain service adjustments—brakes, tune-ups, and so on—but few pay attention to servicing universal joints. DETROIT Universal Joints, for passenger cars, trucks and military vehicles, are designed and constructed to deliver thousands of miles of severe driving without complaint in spite of service neglect.

Detroit

UNIVERSAL JOINTS



UNIVERSAL PRODUCTS COMPANY, Inc., Dearborn, Michigan

of felts produced in roll form is illustrated by the table which compares the weight and thickness range and the splitting resistance specifications for both types of felt.

Sheet felts are classified as Fine Spanish and Spanish, for the finer types, Mexican and Coarse Mexican for the coarser fiber constructions. Under the new standard nomenclature these types are designated by numbers, which also distinguish between the five degrees of density in which each type is made, such as hard, medium and soft, extra hard and extra soft. Standard weights range from 32 lb for an extra hard sheet, 1 in. thick, down to 12 lb for a

1-in. thick extra soft sheet. Thicknesses range from $\frac{1}{4}$ in. to 3 in. For each density weights are proportionate to thickness.

Standards for mechanical roll felts were formulated 30 years ago, first adopted by the Society of Automotive Engineers in 1921, and have been thoroughly refined and expanded by the Felt Association within the past few years. Roll felt standards of the Felt Association, S.A.E., and American Society for Testing Materials correspond, and all felt specifications are subject to the test methods of A.S.T.M., designation D-461-49.

Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES.

General business activity early in November continued at a level substantially above that of a year ago. Increases during this period were reported in department store sales and crude oil output, while bituminous coal production, railway freight loadings, construction, and electric power production declined. For the week ended Nov. 4 the *New York Times* index of activity stands at 166.8, a new high level, as compared with 166.2 in the preceding week and 123.6 a year ago.

The dollar value of department store sales in the week ended Nov. 4, as reported by the Federal Reserve Board, was equal to 315 per cent of the 1935-39 average, as compared with 313 in the week before. At this level, the value of sales showed no percentage change from the comparable week of last year. The total reported since the beginning of the year was five per cent more than the corresponding sum in 1949.

Crude oil output in the week ended Nov. 5 averaged 5,896,450 barrels daily, 1200 more than in the preceding week and 760,850 above production for the similar period in 1949.

Production of bituminous coal and lignite in the week ended Nov. 4 is estimated at 11,375,000 net tons, 275,000 less than the output in the week before but 8,696,000 above the comparable amount last year.

Railway freight loadings in the same period totaled 862,184 cars, 2.9 per cent less than the figure for the week before but 48.9 per cent more than the corresponding number a year ago.

Civil engineering construction volume reported for the four-day week ended Nov. 7, according to *Engineering News-Record*, was \$102 million, as compared with \$200 million in the preceding five-day week. The total recorded since the beginning of the year, at \$10.2 billion, is 46 per cent more than that in the corresponding period of 1949.

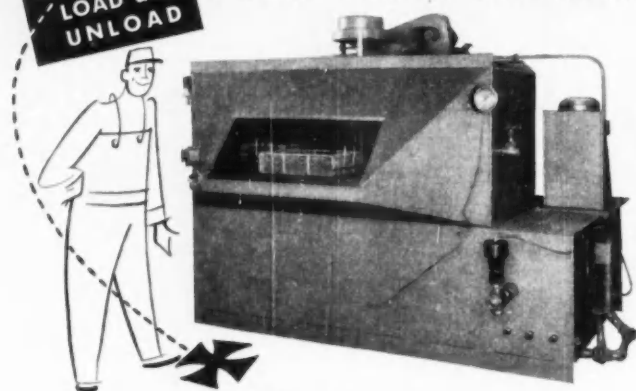
Production of electric power declined slightly during the week ended Nov. 4. At 6551 million kilowatt-hours, total output was 20.5 per cent above the amount a year earlier, as compared with an advance of 20.8 per cent shown in the preceding week.

The wholesale price index of the Bureau of Labor Statistics for the week ended Nov. 7, at 170 per cent of the 1926 average, was 0.2 per cent more than in the preceding week and 12.1 per cent above the comparable figure for 1949.

Member-bank reserve balances decreased \$49 million during the week ended Nov. 8. Underlying changes thus reflected include decreases of \$154 million in Treasury deposits with Reserve banks, \$51 million in the monetary gold stock, \$12 million in Treasury cash, \$11 million in non-member deposits and other Federal Reserve accounts, and \$7 million in Reserve-bank credit. An increase of \$169 million in money in circulation was also reported.

Total loans and investments of reporting member banks increased \$18 million during the week ended Nov. 1. An advance of \$201 million in commercial, industrial, and agricultural loans was recorded. Total business loans, at \$16,523 million, were \$2829 million more than the comparable sum a year ago.

ONE MAN OPERATION with BLAKESLEE METAL PARTS WASHERS



**BLAKESLEE
SOLVENT VAPOR
DEGREASERS**
—economical, efficient—
USE LESS SOLVENT

BLACOSOLV
Stabilized Degreasing
Solvent — one price,
one solvent for all metals

Blakeslee's new washer saves labor, is economical

Just one man can keep the production line going with this time saving metal parts washer. Turn table operation permits loading and unloading in one easy pivot movement. One revolution of the washer turn table and parts come out sparkling clean for a better finishing job with fewer rejects. Blakeslee washers are designed for every type and size of plant operation. Write for the cooperative services of our engineer-trained sales representatives.

G. S. BLAKESLEE & CO.

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New York, N. Y. Toronto, Ont.

*Perfect Circle's
Sensational New*

2 in 1 chrome piston ring set!

NEW CHROME OIL STOPPER

Optional HiPressure spring packed with every Chrome Oil Stopper, for use in badly worn engines —at no extra cost!

TOP COMPRESSION RING

PLATED WITH SOLID CHROME

Double the Life of Cylinders and Rings!

It's here! The amazing new 2 in 1 Chrome Piston Ring Set

Actually two sets in one because two springs, Normal Pressure and HiPressure, are packed with each Chrome Oil Stopper . . . two sets in one because solid chrome plating on the top compression ring and the steel rails of the oil ring assures *twice* the life of ordinary sets!

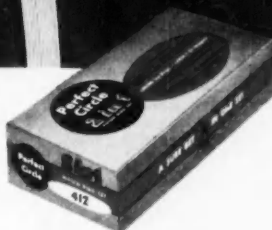
At last, optional spring pressures plus the acknowledged superior bearing and wear characteristics of chrome

give dealers and mechanics the piston ring set they have been waiting for!

Thousands of field installations—in all kinds of cylinders—for all types of service have established entirely new standards of operating economy and life for rings, pistons and cylinders.

Never before in piston ring history has such improved performance been available to consumers with so little difference in cost. Truly, it is

A Sure Bet in ONE Set



Perfect Circle

*The Most Honored Name
in Piston Rings*



IN MACHINE REAMERS

**Nothing
Finer!**

 **precision
adjustable**

MACHINE REAMERS

With Helical Replaceable Blades of High Speed Steel and Wide Adjustment Range. Sizes $\frac{1}{4}$ " to $2\frac{1}{4}$ " Diameter. Regularly supplied with left-hand spiral. Also available with right-hand spiral, on special order.

ERIC S. JOHNSON CO.

**230 EAST OHIO STREET
CHICAGO 11, ILLINOIS**

Write for complete description, specifications and prices today. If you wish a demonstration of these amazing new MACHINE REAMERS can be arranged.

King-Seeley's New Plant

(Continued from page 41)

and other parts requiring electroplating are transported to the plating department after machining and finishing operations have been completed. Here they have a large installation of a modern Hanson-Van Winkle-Munning merry-go-round type automatic chromium plating unit, running about 90 ft in length. It is provided with the necessary tanks for a complete cycle of copper-nickel-chromium coating. The last station on this machine is a steam-heated tunnel for dry-off, through which the conveyor passes enroute to the unloading station. An interesting feature of the plating machine is that it handles simultaneously the entire variety of parts, including those of steel, brass, and zinc alloy.

Before parts are presented to the plating machine, they are suspended on racks on a conveyor for pre-cleaning in a unique washer supplied by Solventol. In the first stage of pre-cleaning, parts go through a separate tank where they are immersed in a Solventol solution which loosens dirt and oil. Passage through the main washer then removes dirt and oil by hot sprays of Solventol formulation. Hot and cold rinses prepare the parts for plating.

It is of interest that King-Seeley has had in operation a formal chart system of statistical control for about three years. Recently quality control was also extended to the plating baths of the electroplating unit, thus providing a scientific control of this important operation.

One of the small departments is fitted with a battery of six of the familiar Roto-Finish tumbling barrels for removing fins and sharp edges on various parts.

Following plating, instrument panels are routed to the paint department where they are suitably spray painted in DeVilbiss air-washed, water curtain booths. Here panels are mounted in a trunnion type fixture to facilitate spraying, a special masking fixture being used where paint is required only at specific areas.

An interesting example of the assembly methods employed here is found in the illustration of an instrument panel assembly line. Panels are assembled completely in a progression from station to station on this conveyor. Sub-assemblies are prepared at the side. It will be noted that air tools are used exclusively on this line.

One of the major assembly conveyors, of advanced character, is the high speed line, illustrated here, for the assembly of the gamut of speedometers. It is U-shaped, for compactness, and has a developed straight length of

some 75 ft. It is traversed by a heavy canvas belt 36 in. wide for transporting parts from station to station. Working stations, handled by female operators, are arranged on both sides of the belt; the number of benches at each station depending upon the nature of the operation. In most cases only one bench is required on each side at a station, in other cases there are three or five as the case may be. Thus it is possible to maintain smooth flow on the conveyor regardless of the time required for a given operation.

For example, calibration is an exacting operation and requires considerable checking and adjustments. This is one of the places where a larger number of operators is required to maintain the pace of the conveyor. It may be noted that this assembly line has a load capacity of 150,000 speedometers per working month.

Heat Treating

(Continued from page 49)

man does all blast cleaning by operating three machines. Parts such as stem pinions requiring straightening are scheduled through the draw furnace and this operation is performed hot by the sixth man. With these six men approximately 1800 lb per hr of carburized and hardened gears are produced.

Reducing operator fatigue is extremely important and every effort is made in that direction in order to maintain a suitable level of productivity. By means of power hoists, roller conveyors and other handling equipment, the physical effort required is not excessive. Working conditions are also notably benefited by the installation of numerous ventilating and exhaust systems.

Future expansion is provided for since five additional continuous carburizers may be installed parallel to the fourth carburizing furnace. Such is the case also for the quenching presses and the gear draw furnaces. Other equipment may be supplemented to a large extent in one direction or another without creating a congested condition.

Gas Turbine Powered Boat

(Continued from page 46)

1.6 lb per hp-hr at 100 hp and 1.25 lb at full power. When a satisfactory heat exchanger has been developed, it is expected to reduce this to 0.8 lb per hp-hr.

It is admitted that this engine is not yet a commercial proposition capable of competing with a piston engine, but the Navy sees advantages in its use where cost is of secondary consideration.

NO THREADED PARTS!

Johansson Milling Machine Chuck
with bayonet locking nut assures
closer fit, tighter grip on cutter with
only one-half turn.



JOHANSSON "QUICK-GRIP" MILLING MACHINE CHUCK

is a fast change chuck for
different sizes of cutters and arbors.
(Shanks— $\frac{1}{8}$ " to $1\frac{1}{2}$ " diameter.)

Use of the fast change Johansson
Chuck reduces operator fatigue
—actual proof on request!

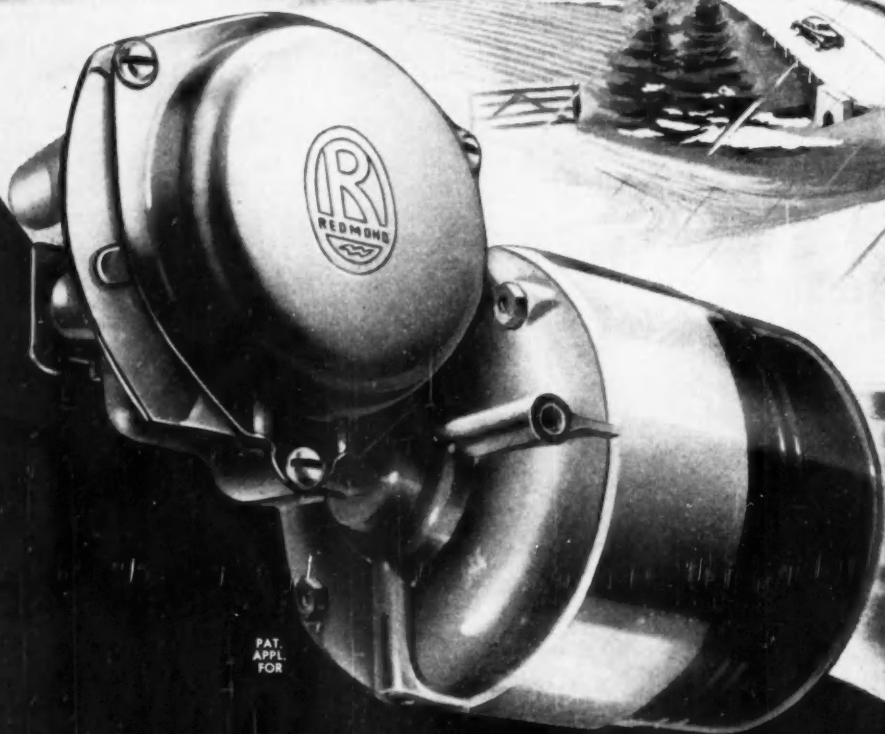
Locking grip so powerful that end
mills up to 5" in diameter can be
driven on heavy cuts.

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Write for complete description,
specifications and prices today. If
you wish a demonstration of this
amazing new MILLING MACHINE
CHUCK can be arranged.

Positive *Electric*



PAT.
APPL.
FOR

Redmond

Safe: HIGH STARTING TORQUE, to ride through ice and snow. POSITIVE OPERATION . . . always ready with constant power when passing or climbing hills.

Sensible: NEW, LOWER COST, MORE COMPACT DESIGN, with *only* one gear reduction unit.
DESIGN IS FLEXIBLE to meet new car manufacturers requirements.

Windshield Wiper



SAFE-R-WIPE

REDMOND

Dependable: UNUSUALLY QUIET HIGH POWER SOURCE . . . the famous Redmond Micromotor.
EXTRA LONG LIFE with silent reduction gear of new design.

SAFE-R-WIPE is built only by REDMOND . . . the BIG name in Small Motors

REDMOND COMPANY, INC., OWOSSO, MICHIGAN, U.S.A.

Making Huge Die Cast Grille

(Continued from page 48)

at the center, weighs 15 lb finished and 24½ lb in the rough before excess gating and flash are removed.

Designed and built by Doehler-Jarvis, the 48-in. die casting machine occupies about nine by 18 ft of space. The die set for the outer frame is enormous and compares in size and weight with automotive press dies. Overall size of the two-section die is 36 by 78 in., while its weight is 14 tons. To accommodate dies of this size and weight, the die casting machine

has been fitted with die plates 100-in. in length.

As the casting comes out of this machine it is dropped into a quench bath and then transported on a flight conveyor directly to a Toledo press for trimming in a special trim die. This is followed by punching 16 fastening holes in a special machine, using a system of hydraulically operated punches. A number of other holes are tapped.

One of the initial problems concerned the method to be employed in

polishing the inside parting line. This is done in production by means of a simple belt sander, located in the center of a large table. The frame is mounted on a fixture which rides on casters, making it a rather simple matter for the operator to present the entire inner surface of the casting to the belt by sliding the fixture.

As the frames complete these preliminary operations, they are hung on an overhead conveyor for transport to the buffing and polishing machine. The machine for buffing the frame is a 20-head, Murray-Way automatic buffing machine of return type, about 105 ft long. A distinctive feature of the operation is the provision of a group of four Hicycle, hand-operated tools arranged in sequence at the end of the finishing section. This makes it possible to buff certain otherwise inaccessible areas while the work is progressing on the machine conveyor. It marks the first instance, to the knowledge of the writer, where a part of this character is buffed in this fashion without necessitating transfer of the work to another polishing line.

For the automatic buffing cycle the frames are individually mounted on suitable fixtures which are cammed to produce up-and-down movement of the work under each wheel-head, in combination with sidewise movement wherever necessary. This arrangement makes it possible to reach most areas of the work in normal fashion.

The buffing department contains a number of other automatic buffing conveyors similar to the one described above, for handling other parts. These units are served by Centir-Spray wet-type dust collectors which take dust laden air from the various buffing heads, wash and filter the air stream, and return clean air to the buffing lines.

Following polishing, the frames are hung on an overhead conveyor for final inspection prior to electroplating. Inspectors then transfer the frames onto plating racks which travel on an overhead conveyor directly to the plating department.

Plating is done in two stages, the initial stages of chemical cleaning, copper plating and nickel plating being done in what is considered to be the largest installation of its kind. The nickel plating unit, made by Hanson-Van Winkle-Munning, is of U-type and runs about 140 ft in length. It is completely automatic in operation and features continuous filtering of all copper and nickel baths.

At present chromium plating is done in a separate unit of batch type design. The company plans the installation of an automatic chromium plating machine directly alongside of the nickel plating unit. As a matter of fact, the

(Turn to page 78, please)



TUTHILL
is the answer
to your
spring problems

Whether it's a spring
for heavy-load trucks
or easy-riding cars
you're after, Tuthill
can supply it.

70 years of spring designing and manufacture have given Tuthill unique "know-how." Tuthill engineers are constantly developing springs designed for specific needs as widely varied as power shovels, overland buses, farm wagons and third-axle heavy jobs.

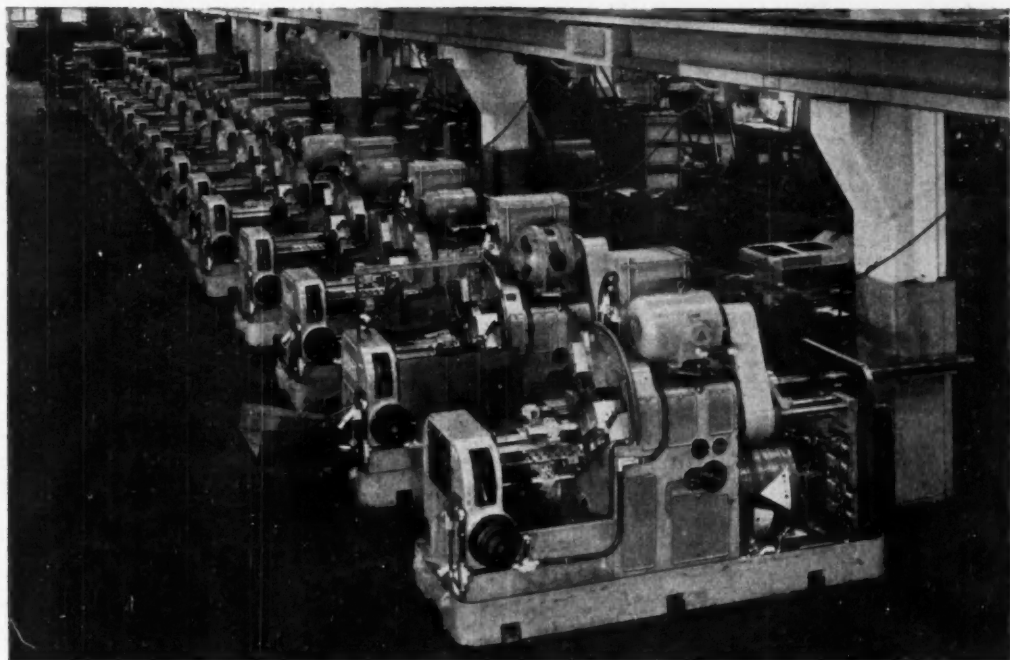
Your Requests for Quotations or Engineering Service
will Receive Prompt Attention

A complete line of leaf springs

standard or special



TUTHILL SPRING CO.
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16 MORE PROOFS OF POPULARITY!

If our salesmen are forced to tell you that our new Acme-Gridley Model M Single Spindle Automatic is so popular we can't keep up with demand, it's no idle boast. The machine sells itself faster than we can build them—and we're building them at top speed, in large lots, as evidenced by this recent photograph of one of our assembly lines.

Here are some of the reasons why our customers are buying Model M's for faster (up to 10 times faster) production of gear blanks, bearing races and similar parts:

- **Eight Independently Operated Tool Slides**—permit use of speeds and feeds best suited to each cut, using carbide or high-speed cutting tools.
- **Three Automatic Spindle Speed Ranges**—provide correct surface speed for a wide range of diameters.
- **Easily Accessible Camming**—minimizes change-over time on small-lot setups.

Formula for profit leadership: Don't wait for your competitors before you discard obsolete machining methods.

- **Turret Indexes Independently**—several short end operations can be performed while heavy forming cuts are being made from the side slides.

- **Rugged, Open Frame**—strength to take full advantage of carbide tools, yet plenty of room for chip clearance and easy tool adjustment.

If these add up to the kind of time-saving, money-saving features you need in a simple, yet versatile, fully automatic single spindle machine, we'll be glad to send you more details—(and we'll name machine deliveries just as early as material supplies for our stepped-up production schedule allow).

The New Acme-Gridley Model M Single Spindle Automatic Bar, built in sizes 2 $\frac{3}{8}$ ", 3 $\frac{1}{2}$ ", 4 $\frac{1}{4}$ ", and 5 $\frac{1}{2}$ ", is completely illustrated and described in this new Catalog M-50.



The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics:
 1-4-6 and 8 Spindle • Hydraulic Thread
 Rolling Machines • Automatic Threading Dies
 and Taps • The Chronolog-Limit, Motor Starter
 and Control Station Switches • Solenoids
 Centrifuges • Contract Manufacturing

foundation for this unit is already in place.

As the frames come out of the chromium unit, they are inspected and hung on other overhead conveyor lines for transport directly to the packing department.

Because of the size of the Packard grille frame, unusual precautions are taken in handling at all stages to prevent physical damage and scratching. For example, the frames are transported on a special rack truck in the course of machining operations. Later on when plated parts are suspended on the conveyors, they are mounted on rubber-covered hooks.

It is of interest that the plating technique was developed jointly by Packard and Doehler to assure specification quality at all points as well as to pass the Packard qualifying 32-hour salt

spray test. Total thickness of plate specified by Packard is 0.0008 in., comprising 0.0003 in. of copper, 0.0005 in. nickel, and a 0.00001-in. chromium strike.

Pressure Vent Radiator Cap

(Continued from page 47)

steam to pass out into the filler neck. Almost complete contact is maintained between the diaphragm and the top of the filler neck. A small amount of steam is permitted to escape around

the cap to provide a visual warning that the cooling system is under pressure. However, almost all of the steam must escape through the overflow tube in the filler neck. This visual warning at the pressure cap, the slight additional force required to turn the cap past the "stop" position, and the warning provided by the hissing of steam in the overflow tube should prevent a person from removing the cap too quickly if there is any pressure in the system.


Major components of the pressure-vent radiator cap are the usual outer shell and spring-loaded pressure valve, a diaphragm in the shell, and a vent valve. The outer shell engages a flange at the top of the filler neck to provide the force required for sealing the radiator; the spring-loaded pressure valve gasket seals the opening from the radiator to the filler neck; and the diaphragm seals the top of the filler neck opening. A hole in the center of the gasket is covered by the vent valve and a weighted valve stem holds this valve open during normal driving operation.

There are three operating positions for the pressure-vent radiator cap. During most driving with the coolant at normal temperatures, the vent valve is in the down, or open, position. As the diaphragm seals the top filler neck opening and the pressure valve gasket seals the bottom filler neck opening, the cooling system is open to atmospheric pressure through the overflow tube and the hole in the gasket above the vent valve.

Certain extreme driving conditions may cause an increase in coolant temperature to the point where the coolant will begin to vaporize. The escaping steam rushing by the vent valve raises the valve and thus seals the system. Therefore, the cooling system operates under pressure and the boiling point temperature rises with the increase in pressure.

The third operating position of the cap occurs when the pressure within the cooling system reaches four psi. At this point, the pressure spring is compressed and the pressure valve gasket is allowed to rise off its seat. Excessive pressure is prevented, therefore, by permitting steam or liquid to escape through the overflow tube.

In addition to providing a vent to the atmosphere during normal driving conditions, the vent valve also prevents any vacuum from occurring in the cooling system when the liquid cools.



WHY

Vulcan

Rubber Coated

Fabrics

MAKE

SUPERIOR

Fuel Pump

Diaphragms

There's an important new trend to VULCAN RUBBER COATED FABRICS for fuel pumps, vacuum booster pumps and other automotive parts actuated by diaphragms.

Leading manufacturers are switching from older materials to VULCAN rubber coated fabrics, having found by test that VULCAN products meet the most exacting operating requirements. One manufacturer recently

chose VULCAN fabrics over 20 other materials tested.

VULCAN fabrics resist oil, gasoline, alcohols, butane, propane, aromatics, solvents and acids commonly encountered in automotive operation.

If your product uses diaphragms, it will pay you to investigate the new, improved VULCAN rubber coated diaphragm fabrics.

Write for literature

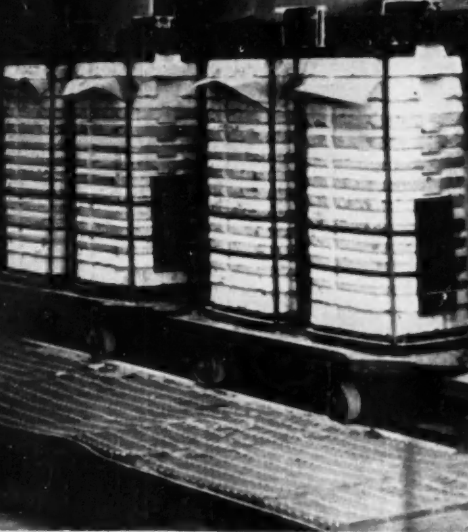


FIRST AVENUE AND 58TH STREET, BROOKLYN, NEW YORK

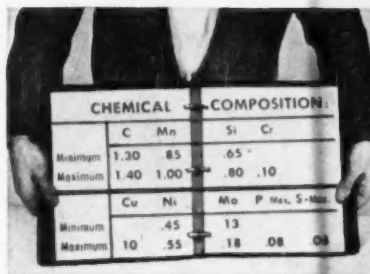
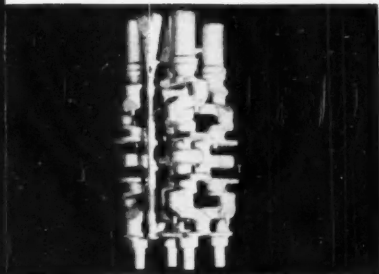
Proven quality control sets new Casting Standards

... and helps lower crankshaft costs

In recent years engineers have developed a healthy respect for castings—particularly Cast Alloy Steel Crankshafts for mass-produced motor cars. At Auto Specialties Mfg. Company, we feel this is due, to a large degree, to the superior quality of today's castings, for example, those produced under the quality controls maintained in our foundry. It is the purpose of this report to give a brief glimpse of some of the extensive facilities and modern equipment with which these controls are exercised.



Progress Report No. 2 on the Application of Mass-Produced Cast Alloy Steel Crankshafts to the solution of some of today's Engine Production Problems.



By a special molding process, stacks of slab cores are arranged to cast 4 crankshafts at one time. Equally unique are—the special chemistry of AUSCO 80, the electric-furnace melting, the foundry techniques, and heat straightening—resulting in Cast Alloy Steel Crankshafts of highest quality, that actually cost less!

To give positive proof of freedom from injurious defects, Ausco Cast Alloy Steel Crankshafts are X-Ray Photographed under a million-volt camera. This is only one of a long series of inspections and tests that these crankshafts must undergo to insure the superior strength and wear resistance which they are so ably demonstrating in daily service all over this country in mass-produced motor cars.

A 100-page book of evidence of the advantages of Cast Alloy Steel Crankshafts for mass-produced motor cars is available to engineers and executives on request.

AUTO SPECIALTIES MFG. CO.
St. Joseph, Mich. Other plants at Benton Harbor, Hartford and Windsor, Ont., Canada.

Some of the Proven Advantages of Cast Alloy Steel Crankshafts Evidenced by Over Two Million in Operation:

● **REDUCED MACHINING COST**

Elimination of the checking operation has reduced the rough machining at least 75%.

● **LARGER SCOPE MECHANICAL DESIGN**

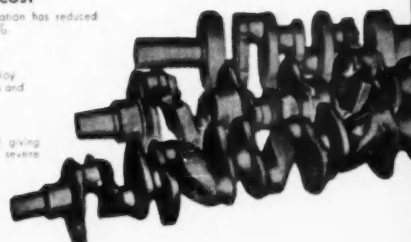
Engineers are practically unlimited, in designing Cast Alloy Steel Crankshafts to meet new engine high compression and high speed requirements.

● **LONG LIFE**

Evidenced by examples of Crankshafts still giving complete satisfaction after 100,000 miles of severe service.

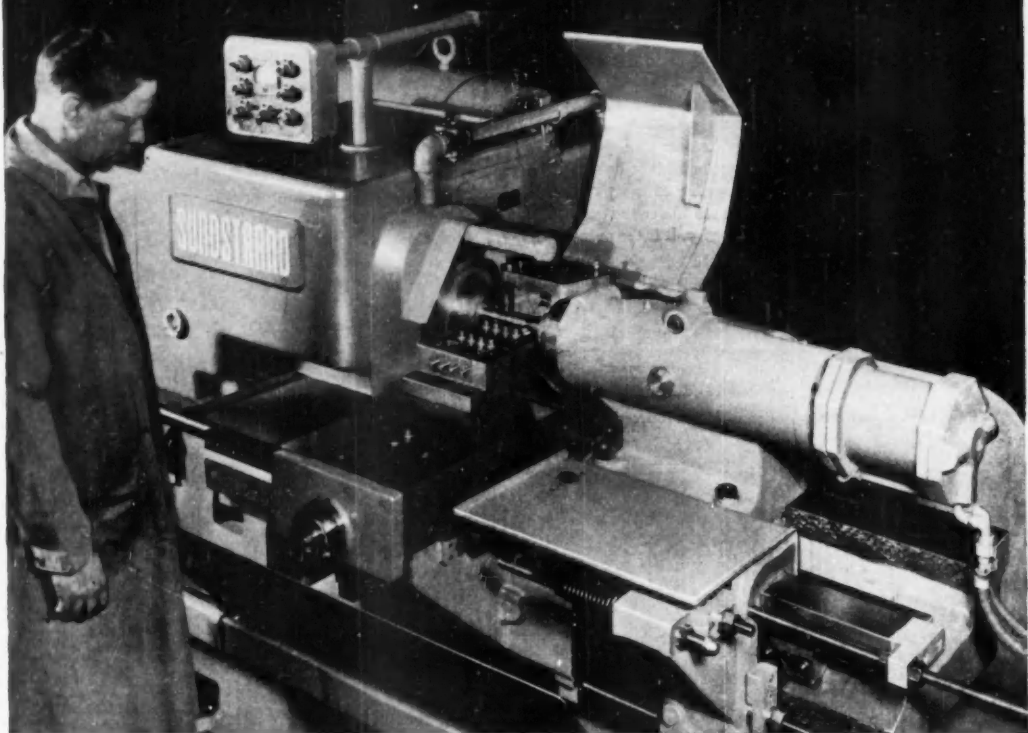
● **MINIMUM BEARING WEAR**

Graphic type of metal provides low friction in the presence of normal lubrication.



CAST
alloy steel
CRANKSHAFTS
AUSCO

Turning Production Increased 70% . . .



On 50 H.P. Model 12A **SUNDSTRAND** Automatic Lathe

The new Model 12A Sundstrand Automatic Lathe is setting production records in many plants. There are specific reasons for this. For instance, it is adaptable to a countless variety of turning operations on parts with a maximum swing (over cross slide) up to 15-1/4" diameter.

It has an unusually heavy precision bearing spindle, high rapid traverse rate and automatic

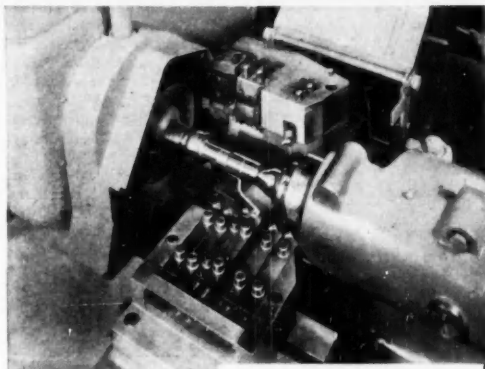
cycling. Consequently, multiple tooling and carbide tools can be used to full advantage on high production or long run jobs. In addition, these same production advantages can be applied to short run work because of the quick cycle changeover feature of this machine.

Like all Sundstrand machine tool installations, this is a result of an "engineered production" analysis of a specific turning problem. It may pay you to call in a Sundstrand engineer. He has actual shop experience with all kinds of applications in practically every type of manufacturing plant. He is acquainted with the problems of production men and may be of help to you. You can call on him without obligation.



RIGIDMILS • FLUID SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT

**Ample Horsepower,
Quick Cycle Changeover
and Improved Tooling
Increase Production
Over Former Method**



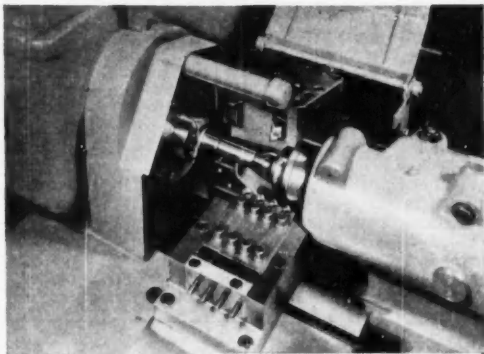
"Before" and "after" illustrations at right show how part is turned, faced, chamfered and formed in one operation with eleven tool set-up shown above.



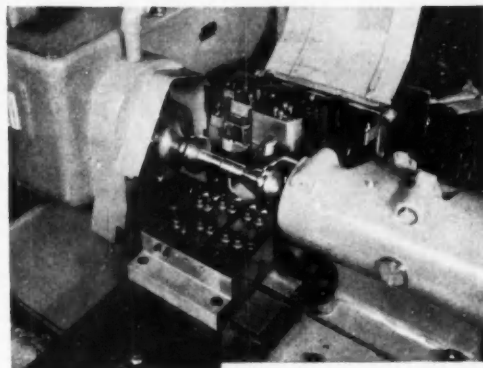
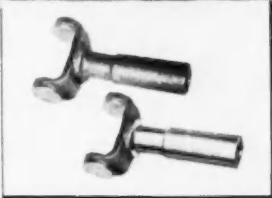
These parts and tooling set-ups represent just three of twelve different jobs for one manufacturer. Production increase averages from 65% to 70%.

FREE Additional Data

This new booklet will give you complete engineering data on the new Sundstrand Model 12A Automatic Lathe. Typical turning jobs and physical dimensions are included. Write for your copy today. Ask for Bulletin 202.



Another operation performed on the Sundstrand Model 12-A Automatic Lathe. Fast tool and machine cycle changeover make it possible to set-up quickly any of the 12 different jobs run over this machine.



Another operation performed on the Sundstrand Model 12-A Automatic Lathe is illustrated in the "before" and "after" pictures at the right. Tooling is illustrated above.



**SUNDSTRAND
MACHINE TOOL COMPANY**

2571 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

Special Body Handling Saves Space

(Continued from page 43)

which is smaller than the automobile body itself, yet able to carry it swiftly and securely, upend and deposit it vertically in a matter of seconds, and then to pick it up just as quickly from that position.

The truck system has actually facilitated capacity car production. It was begun in 1931 with the installation of two experimental machines. New units added from time to time have been progressively improved in design. They have been developed by Studebaker engineers collaborating with Elwell-

Parker Electric Co., the builder of these special trucks. In all the upsurge of activity resulting from demand for Studebakers there has been no need for deviating from this practical handling method.

The passenger car plant is on a 125-acre plot almost in the heart of the city where the famous Studebaker manufacturing operations have continued for generations. Some older buildings once used for wagon works still serve useful purposes providing storage space for lightweight, bulky materials.

The main building of the passenger car body plant is a modern six-story structure having 12 acres of floor space; convertible car bodies are processed in a nearby building of 5½ acres space. Facilities are ample and body fabrication follows well-established assembly line practice, beginning with the welding of metal stampings, continuing to cleaning, bonderizing, painting, installation of doors, upholstery, windows, wiring and fixtures.

Cars are assembled in another building a quarter mile away on this same tract. Completed bodies, mounted on dollies, are transported to the final assembly line building on special semi-trailer type road trucks which shuttle back and forth carrying three units at a time.

As the bodies arrive at the final car assembly plant the dollies are pushed onto a special, continuously operating conveyor-type vertical elevator which carries them to the proper floor. After the bodies are pushed off the elevating conveyor, an overhead device removes them from the dollies and places them on the special body handling trucks.

These trucks carry them to the storage areas, two long corridors adjacent to the assembly lines. Hundreds move in and hundreds go out each day. A body of specific type and color, according to the line setting schedule, is brought out at intervals of less than a minute and placed on a cradle in a conveyor line where the final trimming is performed prior to dropping the body on the chassis. One after another they are moved along by the conveyor in accordance with a specific schedule to meet other components required to make up the specifications of the individual car to which each particular body is assigned.

The body handling trucks work at relatively high speed, 400 or more fpm. They are three-wheelers and adapted to make sharp turns. All 12 are operated by skilled drivers who know how to make the most of the machines' capabilities. For example, a truck comes to a stop for only a few seconds in depositing or picking up a body. The motion is so quick and easy it reminds one of a human hand accomplishing a similar action with a correspondingly small object. Damage is nil for when the body is completed in the body plant a temporary wooden fixture is attached to its front end and when in vertical position it rests on this fixture.

Truck's handling mechanism — controlled by the driver — has a single tine fork at its base and two arms at its upper end. The mechanism is pivoted at the base. As the fork is run under the body the arms

(Turn to page 84, please)

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Precision balls made for your job — available in a variety of materials. Your specifications will receive prompt attention in our Engineering Department. We are thoroughly experienced in supplying the automotive industry with special bearings, retainers and balls. Let us give you our recommendations.

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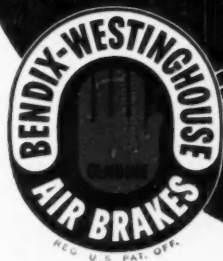
"BENDIX-WESTINGHOUSE AIR BRAKES
HAVE CUT REPAIR COSTS TO A MINIMUM..."

Now My Trucks
Stay On the Job!"

THE
BEST
BRAKE



Have you ever thought about braking in terms of the profit picture of your business? Good, reliable brakes can make a mighty big difference—and that means Bendix-Westinghouse Air Brakes. Why? Because Bendix-Westinghouse Air Brakes reduce maintenance and downtime to an absolute minimum—trucks *stay* on the job, hauling valuable pay loads instead of piling on expenses in the shop. And that's only part of the story. Drivers prefer Bendix-Westinghouse Air Brakes, too, because their extra power means positive stops, greater control and less fatigue at the end of a run. Make sure of this added efficiency and the extra profits that go with it by specifying Bendix-Westinghouse Air Brakes—world's safest power-to-stop!



THE BEST AIR BRAKE IS

Bendix-Westinghouse
BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY
ELYRIA, OHIO

engage the sides of the body in the rear wheelhouse area. The load is elevated slightly and simultaneously tilted backward toward the operator to an angle of about 45 deg. This brings the center of gravity of the body in balanced position for carrying. In depositing the load the action of the mechanism is practically in reverse of the foregoing steps.

Delivered to the starting point of the final body trim line the body is lifted from the truck by an overhead device, the truck backs away and the body is lowered onto the conveyorized cradle.

This handling operation functions smoothly and continuously two shifts a day and is a satisfactory, economical solution of storage and transit.

Cost Methods—Body Engineering

(Continued from page 53)

of the 10 in. lines that were scribed into the clay. From the female plas-

ters, two complete sets of male plasters were cast. One set was sent to the die

shop for die study, preliminary die design, and the building of patterns for the die castings. This allowed the iron to be poured and cured well in advance of the receipt of the Keller plasters. The second set of male plasters and the original female plasters were sent to the model shop where both male and female rough frames were built to within one in. of the plaster surface. These frames were built of either mahogany, Styrofoam reinforced with steel mesh, or a combination of both.

Styrofoam was used as a space filler and lightening agent, especially in the larger models. Because of the plaster's porosity it had to be coated with lacquer and waxed to insure a smooth finish on the cast model. The frame for the male plastic was placed on the female plaster and spaced one in. away from the cast surface to be reproduced. At this point, the plastic was prepared for pouring.

A phenol formaldehyde resin in liquid form was mixed with finely ground cork which served as a filler. Generally the ratio was 10 parts of cork filler to 100 parts of resin. Shrinkage was controlled by the amount of filler used.

To this combination of resin and cork filler was added an acid accelerator to speed the solidification of the plastic. This mixture was then poured into the space between the plaster and the suspended frame, and solidified. The amount of accelerator used can be increased until solidification occurs in a very few minutes, but at the expense of resiliency. A second method and the one most generally used is oven curing. The plastic requires a relatively low temperature of between 90 and 160 F to set the resin. The curing time depends on the amount of accelerator, the size and thickness of the mold and casting, and the curing temperature. Because of these variables, the curing time ranges from 15 min to 12 hr.

When the male plastic had solidified it was balanced to the 10 in. lines picked up from the plaster and the base was routed to body position. Aluminum templates, made to the original master-lines draft, were used as shaper templates to remove the excess material allowed when the cardboard or pressed wood strips were built up just beyond the joint lines on the clay model.

Tinnerman Products Starts Research Laboratory

Tinnerman Products, Inc. will soon start construction of a \$200,000 research laboratory at Cleveland. The company in September formally began operations at its new \$2 million plant at Cleveland. The laboratory would be used for advanced development and engineering of speed nut fasteners.

Thew Shovel Co.—M. B. Garber was appointed director of sales, and J. T. Cushing was appointed sales manager.




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SPRINGS**

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When You Specify Springs*

When we recommend a spring for a particular job you can be sure it's a sound recommendation. For many, many years we have specialized in designing springs and wire shapes for almost every conceivable type of application. Whether your requirements call for a standard design or a spring specially created for your product, you can count on us to provide the spring that is precisely right.

• Would you like a copy of American-Fort Pitt's 28 page handbook of engineering data on springs? It's packed with facts and formulas—and it's yours for the asking.

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McKees Rocks, Pennsylvania



*Take a
second
look!*

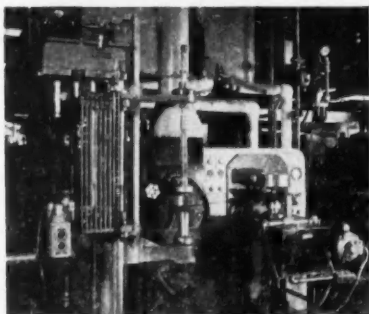
Packard did...and saved

\$1.74 per assembly

with TOCCO* Induction Brazing

THIS is the "planetary output shaft" for the Packard Ultramatic Transmission. It was originally designed to be made from a forging, but Packard engineers "took a second look" and determined that a slight design change, using a casting and a steel shaft, permitted taking advantage of Induction Brazing. This resulted in a savings of \$74,325 in the equipment and tooling for production, in addition to the actual labor and materials savings of \$1.74 per assembly.

When designing *your* new product, or redesigning present products for more economical manufacture, you will profit by considering TOCCO Induction Heating for brazing, hardening, soldering, forging or shrink-fitting. Designing for Induction Heating pays off!



A 30 KW, 10,000 Cycle TOCCO Unit Brazes 45 Assemblies per hr.

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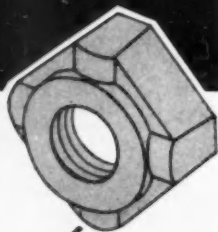
Company

Address

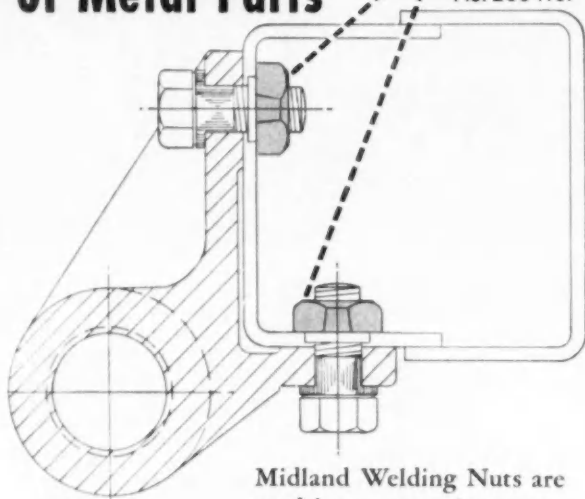
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**A BIG HELP
in the Assembly
of Metal Parts**



U.S. PATENT
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Midland Welding Nuts are used by many major manufacturers for speed and economy in assembling. They are particularly efficient in those hard-to-reach places and "blind spots" as indicated by the drawing above. Midland Welding Nuts will solve similar production problems for you. Write or phone us for complete information.

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World's Largest Manufacturer of
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Air and Vacuum
POWER BRAKES



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DOOR CONTROLS

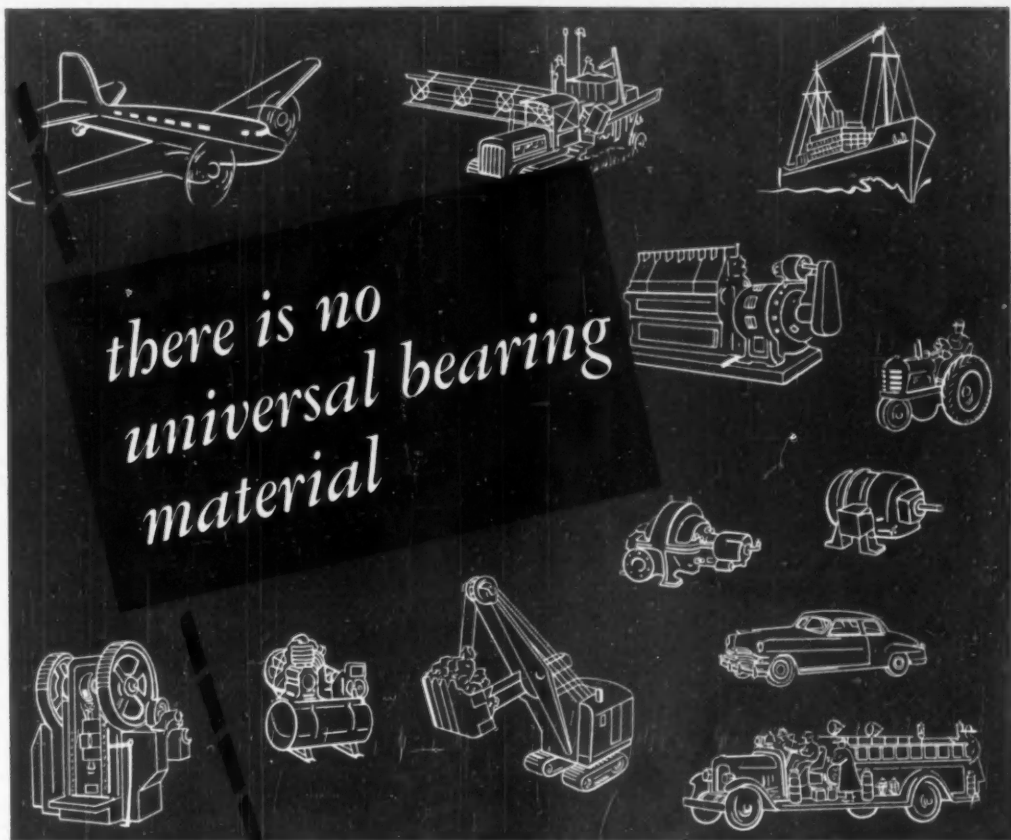


CALENDAR

OF COMING SHOWS AND MEETINGS

Conventions and Meetings

- Nat'l Standard Parts Assoc. Convention, ChicagoDec. 1-2
- Auto. Service Industries Show, ChicagoDec. 4-8
- SAE Annual Mfg. & Engineering Display, DetroitJan. 8-12
- Nat'l Assoc. Engine & Boat Mfrs. Nat'l Motor Boat Show, New York CityJan. 12-20
- Plant Maint. Show & Conf., ClevelandJan. 15-18
- Soc. of Plastic Engrs., New York CityJan. 18-20
- 4th Annual Hot Rod and Motor Sports Show, Los AngelesJan. 25-28
- Inst. of the Aeronautical Sciences, New York CityJan. 29-31
- Nat'l Auto. Accessory Mfrs. Assoc., New YorkFeb. 5-8
- SAE Passenger Car Body & Materials Mtg., DetroitMar. 6-8
- International Auto Salon, Geneva, SwitzerlandMar. 8-18
- Amer. Soc. Tool Engrs., New York CityMar. 17
- Western Metal Exposition and Congress, Oakland, Calif.Mar. 19-23
- Pacific Automotive Show, Seattle Mar. 21-24
- Salone Internazionale Dell Automobile, Turin, ItalyApr. 4-15
- British Automobile and Motor Cycle Show, New York CityApr. 15-23
- Amer. Soc. Lubricating Engrs., Phila.Apr. 16-18
- Amer. Mgt. Assoc., Nat'l Packaging Expos., Atlantic CityApr. 17-20
- Chamber of Commerce Annual Mtg. Washington, D. C.Apr. 30-May 2
- Materials Handling Conference, ChicagoApr. 30-May 4
- A.E.R.A. Convention, ChicagoMay 7-9
- Nat'l Air Races, Cleveland Airport May 19-20
- Amer. Society for Quality Control, ClevelandMay 23-24
- Third World Petroleum Congress, The Hague, Scheveningen, HollandMay 28-June 6
- American Gear Manufacturers Assn. (Annual Meeting), Hot Springs, Va.June 4-6



*there is no
universal bearing
material*



12 MACHINES

How many different Bearings?

There may be 20, 40 or more variations and combinations of alloys and designs in the sleeve bearings. One engine may require different bearing alloys for main bearings, connecting rod bearings, camshaft bearings, piston pin bushings and water pump bushings. That's one reason why, as long-time specialists in research, design and manufacture of sleeve bearings, we specialize in *variety*. Our seven manufacturing plants produce sleeve bearings and bushings in a wide range of material combinations and sizes, in quantities from dozens to millions.

Send for handy Bulletin for your reference file. It shows the "field of usefulness" for a wide range of bearing alloys, and provides a ready reference on bearing applications for your library.

FEDERAL-MOGUL CORPORATION, 11037 Shoemaker, Detroit 13, Michigan

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**SLEEVE
BEARINGS**

FEDERAL-MOGUL

OVER FIFTY YEARS OF CONTINUOUS BEARING EXPERIENCE

NEW PRODUCTS

(Continued from page 67)

P-116—Sand Core Permeability Tester

As an addition to its line of foundry testing equipment, the Claud S. Gordon

Co., Chicago, Ill., has introduced a new, simple, improved instrument for determining the permeability of sand molds and cores, known as the Gordon-Campbell Permtester. The instrument is for use in the foundry for routine production control and in the laboratory for

For additional information please use coupon on page 52

the investigation of new materials and new procedures.

The Permtester is based on the principle of measuring the time required for a definite volume of air under constant pressure to pass through standard test specimens. There are no valves or orifices to complicate its operation. No computations are involved as the permeability values, based on the formula proposed by the Committee on Foundry Sand Research of the American Foundrymen's Society, are indicated directly on the instrument.



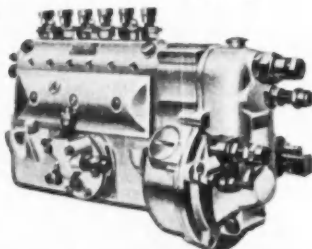
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Transport operators all over the world have learnt to trust this sign.

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

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P-117—Multiple-Alloy Plate Steel

U. S. Steel's Carnegie-Illinois Steel Corp., Pittsburgh, Pa., announces the first of a new group of alloy steels to be known as T-steels. "Carilloy" T1 is a multiple-alloy plate steel, which combines extremely high strength with excellent ductility and toughness, even at sub-zero temperatures.

With almost double the strength of high-strength, low-alloy steels and almost triple that of ordinary welding grade structural steels, "Carilloy" T1 is said to promise considerable savings in applications calling for heavy steel members of 1/2 in. thickness and up. It is designed to be at least two to three times as resistant to atmospheric corrosion as plain carbon steels.

This plate steel is furnished heat treated to a minimum yield strength of 100,000 psi. It maintains adequate toughness even at this high level of strength and is suitable for application where extreme high strength and good weldability are required.

It is declared definitely that welding does not adversely affect the properties of this steel, which has been designed to require no special preheating or postheating treatments in welding or gas-cutting operations beyond those normally used with ordinary structural steels. If low-hydrogen type electrodes are used, "Carilloy" T1 is not susceptible to under-bead cracking. Electrodes that will develop the full strength of the T1 basic metal are available and should be used if 100 per cent joint efficiency is needed.

No special equipment and procedures are required for fabrication. Bending or forming may be accomplished cold if sufficient power is available to overcome the high yield strength of "Carilloy" T1. If hot forming is necessary, the operation must be followed by heat treatment which involves liquid quenching and tempering after the hot forming operation.

The unique properties of this new steel are obtained by blending multiple alloying elements, coupled with precision heat treatment. Carbon content is restricted to 0.18 maximum to promote

(Turn to page 92, please)



One motor and minimum wiring
*assure top performance of **Hydro-Lectric** window controls*

All windows as well as the front seat, hood and rear deck can be operated by *one* Hydro-Lectric power unit.

This means less wiring and fewer parts and assures greater freedom from service troubles. And, the one motor is installed in a location where it is protected against operating failure caused by rain or snow.

The Hydro-Lectric system—developed by Detroit Harvester—has proved its dependability in millions of hours of operation.



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Convertible
Tops

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Systems

Power
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Side Delivery
Rakes

Power
Sweepers

Window Channels and
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Automotive
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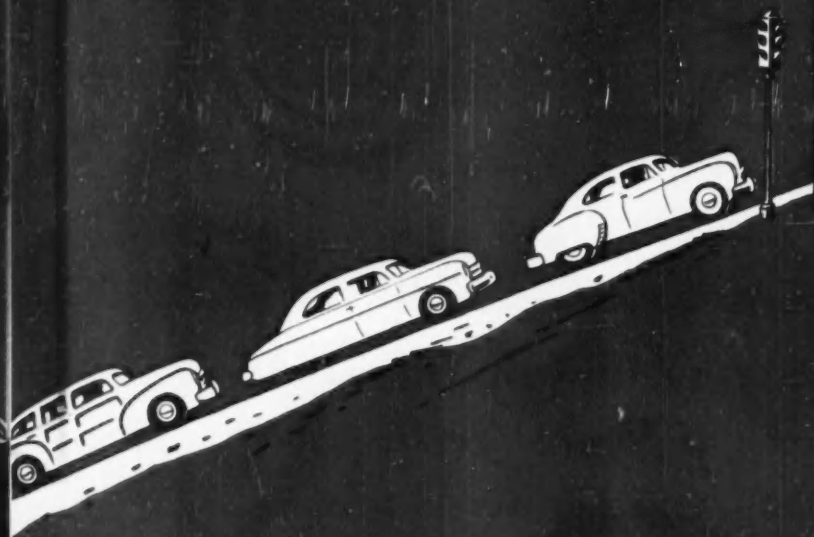
Power
Take-Offs

Contract
Production Parts

from STOP to GO...
with shiftless driving
...via

**R
M**

FIRST IN FRICTION





More and more American motorists call for automatic transmission . . . and the industry meets the demand! Production of automatic units keeps going up . . . up . . . up. R/M plays an interesting part. *Every* automatic transmission now in production employs friction material made by R/M, the largest producer in the field. Some of these materials are woven, some molded; some are compounded, in whole or in part, of powdered metal; many are bonded to metal backings. Other R/M products are used constantly for clutches and brakes covering an even wider range. The experience thus gained is available to all manufacturers faced with problems in metallic and asbestos friction materials, as well as in rubber products. Your R/M representative is the man to see!

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Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings
Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

NEW PRODUCTS

(Continued from page 88)

ease of welding and gas cutting. The "Carilloy" steel composition was developed for possible use in construction of ships and heavy mobile equipment. "Carilloy" T1 is basically a plate steel but may be produced in other forms, it is said.

P-118—Line of Coil Cradles

Developed by the E. W. Bliss Co., Toledo, Ohio, in cooperation with a major automobile manufacturer, a new line of coil cradles with capacities up to 15 tons is available in several sizes. The

cradles can be equipped with special high friction cast iron or formica roll surfaces to minimize slippage on out-of-round coils. The rolls are mechanically driven through an adjustable speed drive. Main gears are fully enclosed and splash lubricated. The rotary side guide plates are mounted on roller bearings and are adjusted manually, as illustrated. Provision is made for motor adjustment of these guide plates where desired.



One of a new line of Bliss coil cradles

To make HARDENED & GROUND PARTS Requires EXPERIENCE!

NOTHING we make tells a more complete story of quality than the king pin shown here—involving expert knowledge of materials; close-limit, intricate machining; scientifically controlled heat treatment; and micro-finish grinding. Result: A product in which both automotive manufacturers and ultimate users can have the utmost confidence.

Our specialization of over 40 years has earned us many satisfied customers among makers of trucks, tractors, trailers, buses, axles, off-the-road machines, and Diesel locomotives.

We would like to have you consider Brown Hardened and Ground Parts for your own requirements. Please write or wire.

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Parts include . . .

King Pins
Shackle Bolts
Shackle Pins
Brake Anchor Bolts
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Beam Bolts and Bolts
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Water Pump Shafts
. . . anything in the hardened and ground line, of any analysis steel, up to 4 1/4" diameter.

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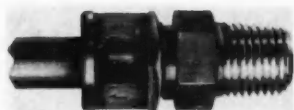
SYRACUSE, N. Y.

C. H. Ehlert, 3407 Clarendon Rd., Cleveland • N. F. Spring, 4716 Balfour Rd., Detroit • R. C. Sanderson, 5352 Broadway, Chicago • Harry J. Windmiller, 1704 Carlton, Fort Worth • Elmer L. Kingsland, 6888 Beechley Ave., Long Beach, Calif. • J. B. Hunt, E. L. Kingsland Co., 3611 S. E. Yamhill St., Portland, Ore.

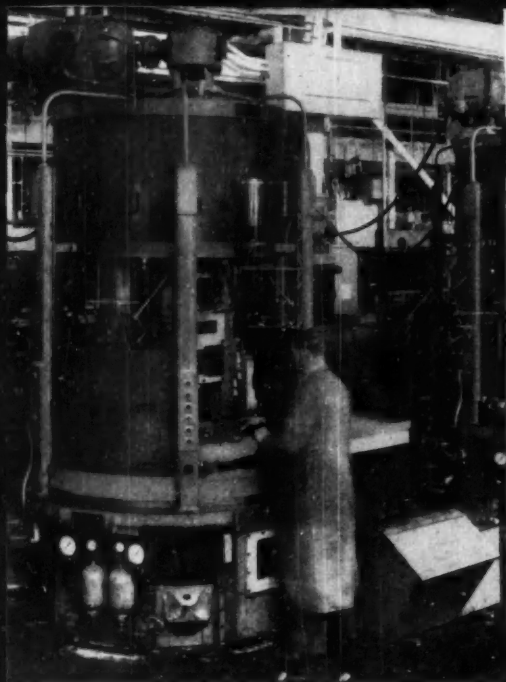
P-119—Leaktight Tube Fitting

Swagelok fittings made by the Crawford Fitting Co. of Cleveland, Ohio, are designed to eliminate bothersome small leaks, notably in instruments. The fitting provides a vacuum tight seal by means of two ferrules and the threaded chuck inside the Swagelok's nut, which clinch tight around the tubing wall.

Fittings hold heavy or thin wall tubing equally well and are made for use



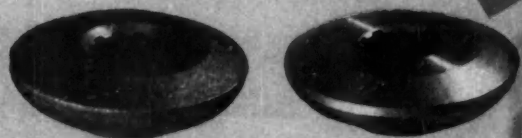
Crawford leaktight Swagelok fitting



TYPE "K" 6 STATION 12-SPINDLE MULT-AU-MATIC

83%

INCREASE In Production



Type "K" Mult-Au-Matic 550 Pcs

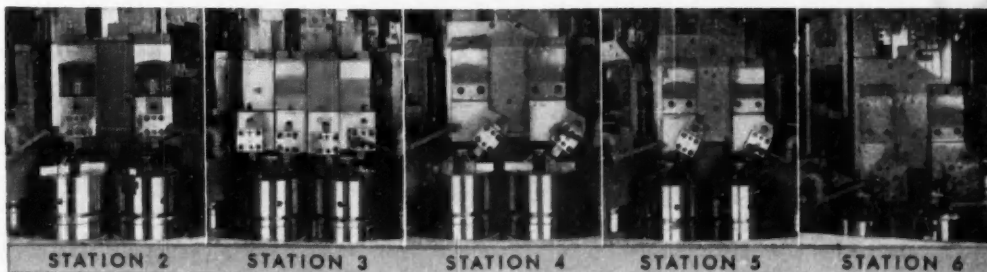
Type "D" Mult-Au-Matic 300 Pcs

A QUOTATION FROM THE FIELD:

"We were especially impressed on this job with the ease in which the operator was able to load and unload this machine at the rate of 550 pcs. per hour compared with the operator on the 8 spindle double index Type "D" Mult-Au-Matic on the same operation, who was busy trying to produce 300 per hour."

Twin spindles and twin tooling at each station, and each station with its succeeding operations, provides a progressive, high efficient Production Method on Differential Side Gears.

Ask for information on Type "K" Mult-Au-Matic application to your work.



STATION 2

STATION 3

STATION 4

STATION 5

STATION 6

Refinement in design, higher spindle speeds, faster index and in many cases an improved method for 1st and 2nd chucking on the same machine are only some of the factors that place the Type "K" Mult-AU-Matic in a class by itself for Productive Economies.

THE BULLARD COMPANY BRIDGEPORT 2, CONNECTICUT

NEW PRODUCTS

For additional information please use coupon on page 52

with tubing material of aluminum, brass, copper, steel, stainless steel and plastic. Laboratory tests are said to have demonstrated bursting of the tube before the fitting will leak. It is pointed

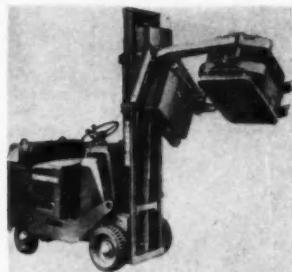
out that Swagelok fittings save time in assembly because no flaring of the tubing is necessary. They come completely assembled, finger tight. By simply inserting the tubing into the nut, and applying one and one quarter turns, the job is done.

During assembly the tubing remains stationary throughout the brief tightening operation, transmitting no damaging torque or twisting to the tube during the one and one quarter turns.

Recommended for overcoming problems involving pressure, vibration and torque, Swagelok fittings are available

in brass, Monel, aluminum, steel and stainless steel, useable tubing $\frac{1}{8}$ to 1 in. OD.

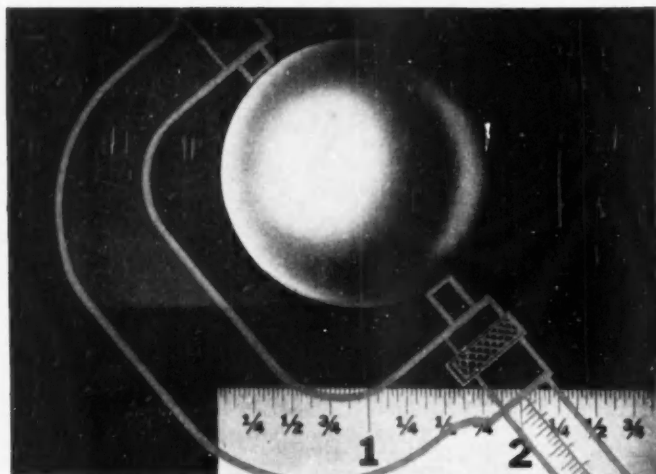
P-120—Annealing Pot Dumper



An unusual variation of the revolving barrel grab, a materials handling development of Towmotor Corp., Cleveland, Ohio, is this annealing pot dumper which picks up, rotates and dumps heat-treated metal parts. In operation, the pot dumper picks up a pot of castings after it has been removed from the annealing oven and cooled, carries the load to a shake-out table, inverts the pot of castings over the table, and places the inverted pot on the table. After the pot of castings has been "shaken out" to empty it, the lift truck picks up the pot, rotates it to an upright position, and places it on a conveyor which returns it to the annealing department for further use. Shown mounted on a Model LT-48 Towmotor lift truck, the annealing pot dumper has a capacity of 2,100 lbs at 30 in. load center. Height of lift is 108 in. and over-all lowered height, 83½ in. To protect the lift plunger from pitting and scoring by dust and abrasives in the air, the unit is equipped with a tubular steel hoist protector.

ONLY A BALL

has...One Dimension...One Surface



but oh—how important

Important not only in precision ball bearings, but also in the lot of other applications where Strom metal balls have been doing the job better. Strom has been in on a great many ball-application problems, and knows how important these two factors are for the best results.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

Strom STEEL BALL CO.
1850 So. 54th Ave., Cicero 50, Illinois
Largest Independent and Exclusive Metal Ball Manufacturer

Publications Available

(Continued from page 52)

aircraft piston engines. Design and performance information plus other important data are given in the eight page brochure.

L-128 Accessory, Lift Truck

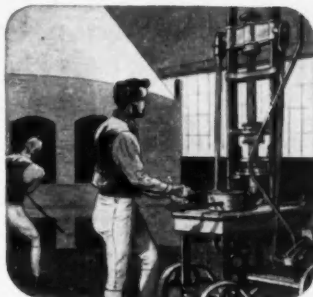
Towmotor Corp.—A new Accessory Data Sheet covering the details of a new Revolving Carriage is now available to fork lift truck users. Specifications, dimensions, and capacities of the unit that rotates 360 deg about a horizontal axis in either direction are provided.

L-129 Atmosphere Furnaces

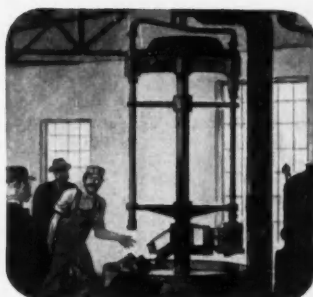
Surface Combustion Corp.—One of the newest tools available to the production heat treater, the rotary retort controlled atmosphere furnace, is described in a new, attractive bulletin, SC-147, just issued.



1 1621—Glass was money! America's first glass factory was actually a mint—not for the manufacture of coins but to make glass beads for use as money when buying land, food and furs from the Indians.



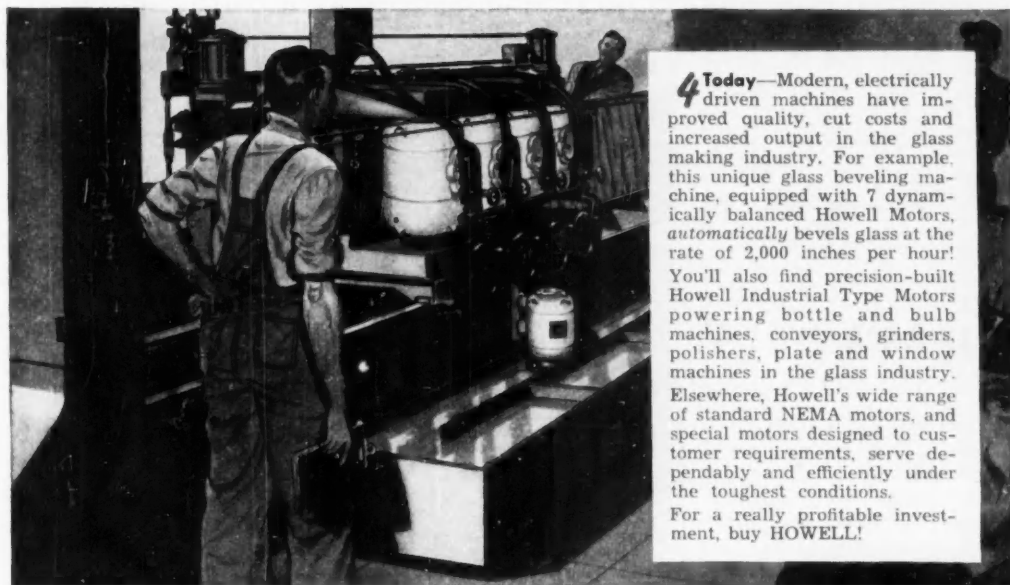
2 1827—Blown glass was the rule until Enoch Robinson, a carpenter, figured glass could be pressed into shape... the glass pressing machine was born. Electricity to power new machines was still to come.



3 1899—Owens invented a machine to make bottles as the machine age arrived in glass. By 1915, Howell "Red Band" Motors were making important contributions to this and other industries.

ANOTHER HOWELL SUCCESS STORY

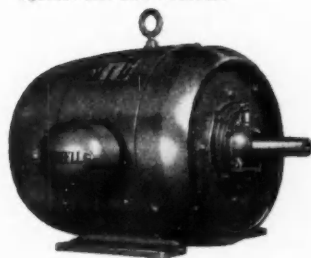
GLASS...from artisans to automatic machines



4 Today—Modern, electrically driven machines have improved quality, cut costs and increased output in the glass making industry. For example, this unique glass beveling machine, equipped with 7 dynamically balanced Howell Motors, automatically bevels glass at the rate of 2,000 inches per hour! You'll also find precision-built Howell Industrial Type Motors powering bottle and bulb machines, conveyors, grinders, polishers, plate and window machines in the glass industry. Elsewhere, Howell's wide range of standard NEMA motors, and special motors designed to customer requirements, serve dependably and efficiently under the toughest conditions. For a really profitable investment, buy HOWELL!

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Conveyorized Paint Shop Operations

(Continued from page 39)

air at 35 F and raising temperature to 80 F. All burners operate on natural gas, the rated load being 192-million Btu per hour.

Another noteworthy feature of interest is the provision of a pre-heated supply of water to the wet deck to make things comfortable for the operators even in the dead of winter. The water supply is collected from the hundreds of welding units while hot, then recirculated to the wet deck.

The paint shop occupies about 144,000 sq ft of floor space and features a twin power and free conveyor system to provide a production flow of 60 bodies an hour. First operation is the six-stage, spray type combination washing and phosphating machine, followed by a hand blow-off, then a dry-off in an oven where bodies are subjected to a five-minute dry at a temperature of 350 F. This oven has a heat capacity of 4-million Btu per hour.

After knife glazing and set time bodies enter a prime spray booth. Water is circulated in the booth tank at the rate of 4000 gpm. Next is passage through a pressurized enclosure to allow paint solvents to evaporate, followed by a three-zone prime bake oven in which bodies are baked for 25 minutes at 250 F.

Then in order follow—wet sanding, hand blow-off, inspection, and a single zone drying oven. This, in turn, is followed by a number of detail operations and the application of deadener in a dry type booth.

Before entering the sealer oven, bodies are given a set time in an enclosure under slight positive pressure. The sealer oven is of four-zone type where bodies are baked for 25 minutes at 325 F, then enter a cooling tunnel.

Inspection, dinging, and final wet deck operations continue in order. Hand blow-off is done in a partitioned booth held under negative pressure to prevent dust blown off bodies being carried through conveyor openings into the paint room. Vacuuming is done in a similar booth, this one being held under positive pressure to insure air movement through conveyor openings, preventing entry of dust from the paint room.

Bodies now are ready for finish enamel. The spray booth is 100 ft long, provided with four pumps of 1250 gpm capacity, each, for water distribution. Then bodies move into the finish enclosure from which they enter the five-zone finish bake oven. Here the work is baked for 35 minutes at 250 F.

Upon leaving the oven bodies progress through a cooling tunnel preceding inspection.

All ovens are direct gas-fired, automatically controlled, of convection type with all equipment located on platforms above the oven. Ovens are provided with an air seal at each end to prevent leakage of heated air to the surroundings.

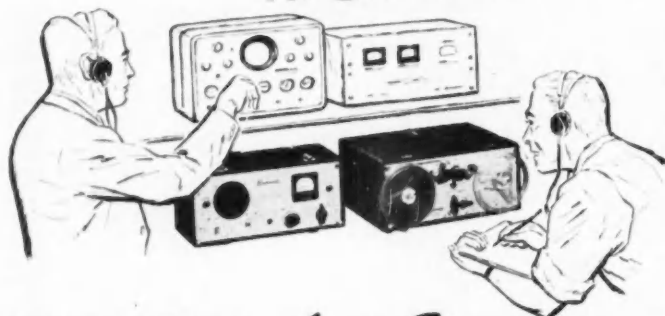
In general, the spray booths are of down-draft design, having an exhaust capacity of 2000 cfm per ft of booth. Fresh air is supplied in a volume slightly less than this to prevent overspray from leaving the booth. Filtered air is supplied through diffusers and exhausted through floor grating located in the center and running the full length of the booth.

Four rows of fluorescent lights running the full length of the booth provide shadowless lighting. Of interest is the fact that all paint circulating piping is concealed behind a removable false wall, thus providing flush construction so desirable in reducing dirt and maintenance problems.

At each end of the booth is a conveyor type scum unloader which auto-

(Turn to page 98, please)

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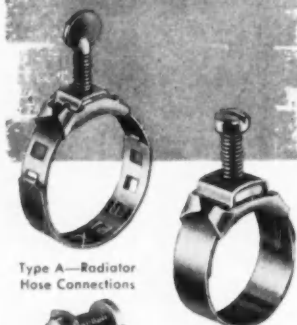


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General Information on Paint Department

No.	Unit	No. Zones	Temp Deg F	Length Ft	Exhaust Air Cfm	Air Req'd. Cfm
2	Bonderite	6 Stage		188	29,900	
2	Bond. dry-off oven	1	380	60	12,400	
2	Bond. cooling tunnel			18	30,000	30,000
2	Prime booth			80	320,000	300,000
1	Prime enclosure			42		30,000
2	Prime oven	3	325	175	30,000	
1	Prime wet deck			100		63,000
2	Prime dry-off oven			80	12,400	
2	Prime cooling tunnel			18	30,000	
2	Deadener booth			80	320,000	300,000
2	Sealer booth			80	320,000	300,000
1	Sealer—finish enclosure			42	20,000	50,000
2	Sealer oven	4	325	175	46,000	
2	Sealer cooling tunnel			18	30,000	
1	Sealer wet deck			110		60,000
(on 180° turn)						
2	Sealer dry-off oven			80	12,400	
2	Sealer cooling tunnel			18	30,000	
2	Blow-off booth			28	30,000	
2	Tack rag room			18' 6 1/4"		20,000
2	Finish booth			100	400,000	380,000
2	Cooling tunnel	5	250	280	35,000	
1	Two-tone tack rag			21	30,000	
1	Two-tone booth			20		15,000
1	Two-tone enclosure			60	120,000	110,000
1	Two-tone exhaust			51' (on 180° turn)		12,000
1	Two-tone oven				5,000	
1	Two-tone cooling tunnel	4	230-240	200	19,000	
1	Bonderite area vent.			21	15,000	
1	After Bonderite area vent.					60,000
1	Between Bond. dry-off booths					60,000
1	Sealer deadener area					15,000
						135,000
Total					1,637,100	1,640,900

Air Supply Capacity Summation

12 Units @ 120,000 cfm	1,440,000
2 Units @ 100,000 cfm	200,000
	1,640,000 cfm
Air exhausted to atmosphere	1,637,100
Air for pressurized bldg.	2,900
	1,640,000 cfm
Required air supply capacity	
2 units @ 96,000 cfm = 132,000 cfm	

matically gathers and deposits scum while booths are in operation.

A notable feature of the cooling tunnels installed here is the flush constructed, nozzle type design. Found immediately after each drying oven, these tunnels serve the dual purpose of cooling as well as ventilating the area in which they are located. Each tunnel has an exhaust capacity of 15,000 cfm, exhausting to the atmosphere, and a supply capacity of 15,000 cfm taken from the building by means of a separate fan, thus contributing to area ventilation.

Coming to the details of the conveyor system, it may be noted that the paint shop area contains a total of 20,360 ft of power and free conveyors in the form of 50 different conveyor lines. These conveyors are divided into eight independent systems plus one independent group, the major conveyors in each system being synchronized with one another.

Electrical controls, except motor starters, are contained in 57 control panels, the control panels and motor starters being individually mounted and located near the drive or equipment they control. In addition, there is a centrally located master control room.

Each conveyor drive control panel has a four-position switch—auto, blank, off, manual—to permit manual selection of conveyor operating circuits. The selector switch must be in "auto" position on each conveyor of a given system before that system can be synchronized from the master con-

trol room. When the switch is turned to "blank" the conveyor continues to run on "auto" but the signal lights go on. "Manual" allows a conveyor to be operated with the jog push button.

The operation begins with the transfer of bodies from body-in-white trucks to the overhead power and free conveyor system for distribution to the Bonderite area. Here the paint system is divided into two independent sections, one served by even numbered conveyors, the other by odd numbered conveyors. Distribution or transfer to one system or the other is made automatically by an alternating switch. Once a body has been shunted to an oven or odd-numbered conveyor system it will follow that system to the end of the line.

Since it is not desirable to expose bodies in the Bonderite unit for more than a certain period of time, special means are provided for shutting off the flow of bodies from the body-in-white line to Bonderite and for diverting bodies to a series of loop conveyors where they are stored until the operation can be restarted.

It is also necessary to clear bodies from Bonderite and paint spray booths at the end of the day. At this time the Bonderite unit is cleared of bodies and the last body in the unit moved into the dry-off oven. In the case of paint spray booths, arrangement also is made to move bodies out for the night. This is done by moving the selector switch to "night" operation just before the
(Turn to page 100, please)

Doehler-Jarvis First...AS USUAL

One-Piece Die Cast Garnish Mouldings for the 1951 Kaiser

Cast Moulding Gives Best Fit

A notable styling improvement on the 1951 Kaiser is the relative absence of exposed mounting screws on the window garnish mouldings.

This is mainly attributable to the fact that the new mouldings are manufactured from a one-piece die-cast rather than a stamped.

The greater rigidity of the aluminum die-cast part, supplied to K-F by Doehler-Jarvis, makes fewer mounting screws necessary.

Only two screws—one at each end—are necessary in the long base of the molding, while the stamping required screws along the full perimeter.

Rigidity of the new molding makes it possible to place the upper exposed edge of the door. The front garnish molding is mounted with four screws, the rear with five.

Other advantages of the die-cast are these:

1—The one-piece part provides a better fit. There no fitting problems resulting from variances in welds or metal finishing as encountered in

the welded stamping.

2—As compared with stamping, die-casting of the new molding, due to its design, results in a slightly lower per part cost.

3—The better fit of the die-cast part and the reduction in the number of mounting screws has reduced installation time, with a resultant saving in assembly cost.

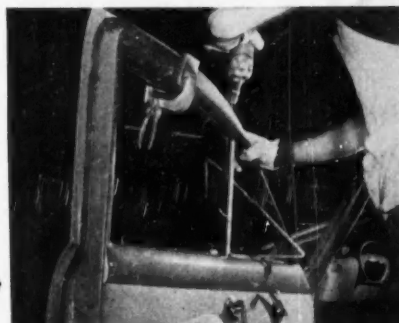
4—The better fit and the fact that there are fewer screws to be mounted reduces the possibility of damage to the molding during installation.

Reprinted from
Kaiser-Frazer News

Die casting may be the answer to your problem, just as it was for the Kaiser-Frazer Corporation in the production of garnish window mouldings for the 1951 Kaiser. The same Doehler-Jarvis research, engineering, and mass-production facilities which made this development possible are available to you.



DIE CASTING IS SO RIGID that only two screws are needed on the long base.



STYLING IMPROVEMENT—rigidity also permits placement of top screws through unexposed edge.



ONE-PIECE DIE CASTING gives better fit—reduces assembly time.

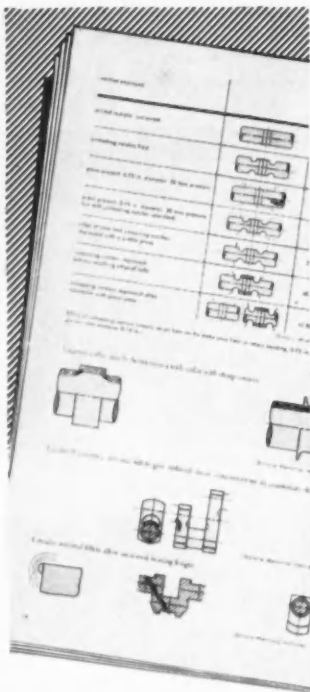


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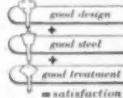
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conveyor is shut down. This stops the conveyors momentarily and initiates a new cycle when the start button is pressed.

After bodies have been finished they enter the inspection area. OK'ed bodies are permitted to move to the trim line around a simple loop through an opening in the wall. If repair is necessary the inspector routes the body onto the repair line or to the free track for heavy repair. Similarly, two-tone jobs are routed down the line to the two-tone department.

The dispatching area with its switching points has been termed "Grand Central Station" by the operating staff. A number of similar switching points are found elsewhere, the objective being to provide by-pass facilities and storage lines capable of taking up the surge in the system in the event that normal production lines are loaded while bodies are still entering the system from feeder points.

It is of interest that synchronization has been achieved by rather simple means. In the first place, conveyor drives are of conventional type in which a driving sprocket attached to a reducer is driven by silent chain from a variable speed transmission, the latter being actuated by an a-c motor. Synchronizing elements are attached to the variable speed transmission and speed changes effected through a servo motor. Instrument synchro located near transfer points inform the electronic panel as to the exact position of each link of the chain pushing the carrier.

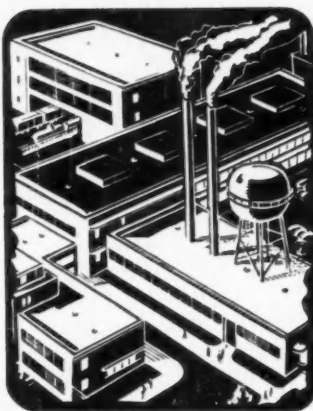
In essence the system of synchronization is very flexible and permits a wide variety of maneuvers in accordance with requirements or special situations that may arise during a day's operation.

BOOKS...

INDIUM, compiled by Maria Thompson Ludwick, published by The Indium Corporation of America, New York N. Y. Besides covering very briefly the history of the Indium Corp., this book contains material on the subjects of discovery, occurrence, extraction, general physical and chemical properties, electrochemistry, analysis, alloys of indium with other metals, miscellaneous information, as well as phase diagrams, photomicrographs and various charts. A feature is the annotated bibliography which presents a great deal of material on indium from widely scattered sources. No attempt was made by the author to cover the subject matter in its entirety, but to deal with it in general, inasmuch as the bibliography will give complete reference files to those interested in pursuing any particular phase of the subject.

AUTOMOBILE HISTORY SCRAPBOOK, published by Wileysworth-Chastaine, Inc., 7134 Alhambra, Mission, Kansas. Price \$1.50. Displaying the early work of over 85 manufacturers, this book has approximately 250 advertisements and illustrations of ancient and vintage automobiles dating back as far as 1901.

(Turn to page 102, please)



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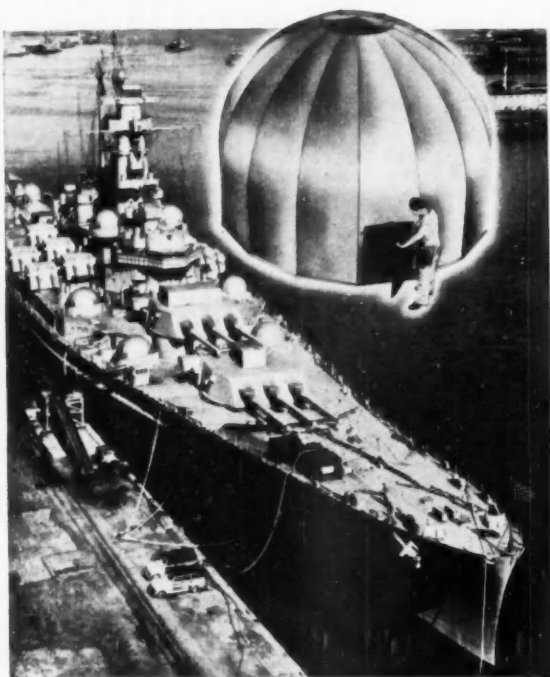
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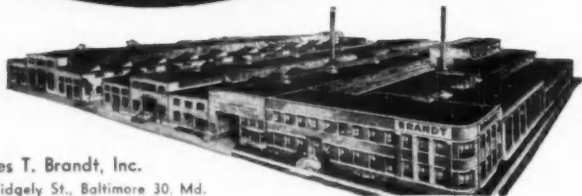
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MAJOR PROBLEMS OF UNITED STATES FOREIGN POLICY 1950-1951, published by *The Brookings Institution*, Washington, D. C. Price \$3.00. Fourth in a series of annual volumes dealing with the foreign policy problems of the U. S., this book gives the reader a brief survey of the present world situation. An account is given of the fundamental and continuing objectives of the U. S., Great Britain, and the Soviet Union.

THE FRICTION AND LUBRICATION OF SOLIDS, by F. P. Bowden and D. Tabor, published by *Oxford University Press*, 114 Fifth Avenue, New York, N. Y. Price \$7.00. This monograph describes an experimental study of the physical and, to a less extent, of the chemical processes that occur during the sliding of solids—particularly of metals—and an investigation into the mechanism of friction and boundary lubrication. It is not a general textbook, since it deals almost entirely with experimental researches carried out by the writers.

METALS AT HIGH TEMPERATURES, by Frances H. Clark, published by *Reinhold Publishing Corp.*, 330 W. 42nd St., New York, N. Y. Price \$7.00. Designed primarily to cover heat-resistant alloys and special alloy steels, but including other metals such as aluminum, lead and magnesium alloys, this book is a compilation of the most recent available data on the properties of metals at elevated temperatures.

Radial Engine

(Continued from page 45)

"A" must naturally be balanced, but the motions of all connecting rods are identical (except for phase difference).

The inventors' original thought of making the compression ratio adjustable during flight is now accomplished by turning the link centers "F," Fig. 3a, an angle β around the crank shaft center "C." These centers are located in a rang "E" which is mounted in the rigid framework and can be rotated through proper mechanism by the pilot. When turned an angle β as in Fig. 3b, it is seen that the piston is drawn away from its top position, and as long as the ring is fixed in this position, the piston will continue to operate with reduced compression. All cylinders will be equally affected. The connecting rods, however, will then operate asymmetrically about angles α_1 and α_2 . This is an advantage if rotation of the crankshaft is so arranged that the power stroke occurs when going through the smaller angle α_1 and the return stroke through angle α_2 . In this position the center of rotation "B" of the connecting rod wrist pin does not coincide with the crank pin center "B."

The accompanying illustrations, Figs. 4a and 4b, show an exhibition model in positions of two different compression ratios. The supporting links and parts referred to above are readily recognized; the lever "L" on this model is used to rotate the ring "E" to produce desired variation in the compression ratio.

Patents on this engine have been issued to John S. Sharpe (U. S. Patent 2,378,507), also John S. Sharpe and Louis S. Clarke (U. S. Patent 2,264,484), both having been assigned to Franklin Institute of Pennsylvania.

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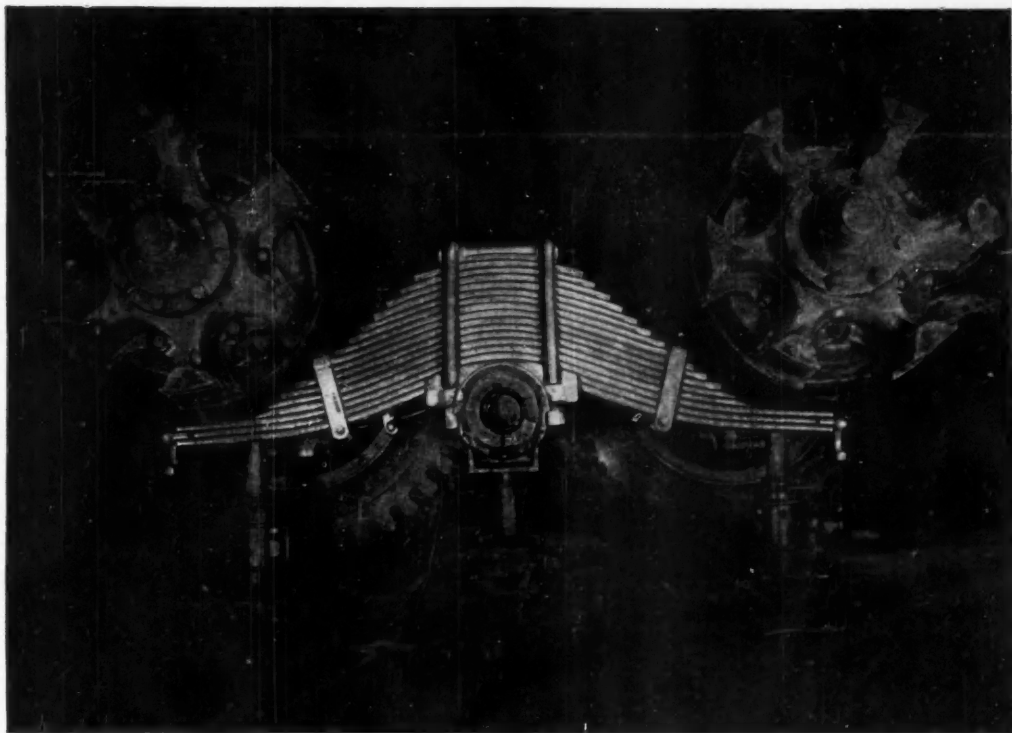
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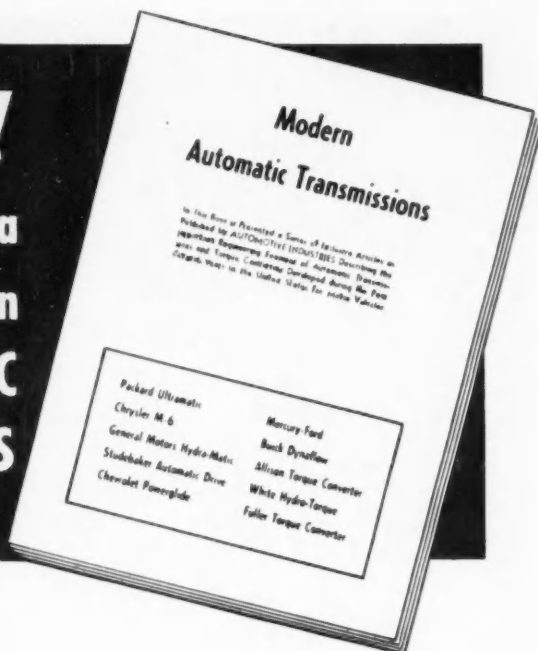


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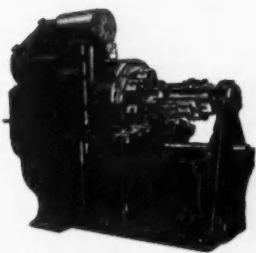
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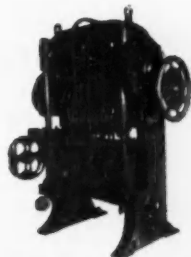
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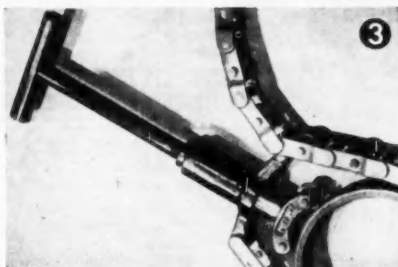
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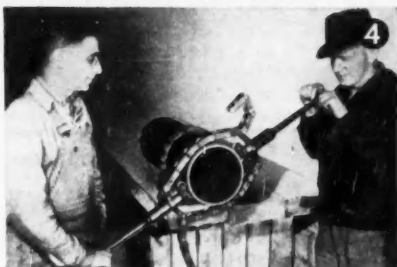
"WHEN WE STARTED making this cutter, one main problem was finding a way to attach a machined bar to a piece of tubing, and adding a T handle to the tubing.



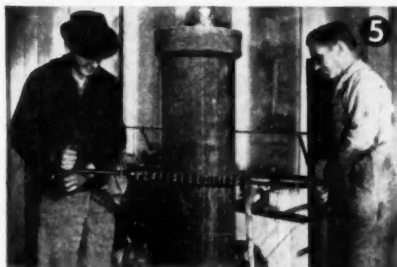
"WHAT MADE THE PROBLEM more tricky, the joints had to take severe stresses—both rotary and tensional. It was without solution until your representative demonstrated EASY-FLO low temperature silver alloy brazing.



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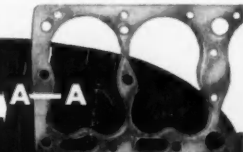
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Aetna Ball & Roller Bearing Co.	68	Chicago Rawhide Mfg. Co.	—	General Controls	—
Ajax Manufacturing Co., The.	111	Chicago Rivet & Machine Co.	—	General Electric Company.	65-66
Allegheny-Ludlum Steel Corp.	114	Chicago Screw Co., The.	67	General Radiator Co.	110
Allied Products Corp.	—	Chilton Co. (Direct Mail).	111	Gibson Co., Wm. D.	101
Aluminum Co. of Amer.	110	Cincinnati Milling Machine Co.	16	Globe-Union, Inc.	—
Aluminum Industries, Inc.	—	Cincinnati Shaper Co.	—	Great American Industries, Inc., Rubatex Div.	—
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American Chemical Paint Co.	—	Climax Molybdenum Co.	100		
American-Fort Pitt Spring Div.	84	Columbia Steel Company.	—	H & P Die & Stamping Co.	110
American Steel & Wire Co.	—	Columbus Coated Fabrics Corp.	—	Handy & Harman.	109
Amgears, Inc.	—	Cone Automatic Machine Co.	—		
Armstrong Cork Co.	—	Continental-Diamond Fibre Co.	—		
Associated Spring Corp.	101	Continental Motors Corp.	—		
Auto Specialties Mfg. Co.	79	Continental Tool Works Div.	59		
Automotive Gear Works, Inc.	27	Cotta Transmission Co.	1		
Automotive Industries	106	Crane Packing Co.	—		
		Cross Company, The.	12		
		Cummins Engine Co., Inc.	—		
Baird Machine Co., The.	107				
Barber-Colman Company	—	Danly Machine Specialties, Inc.	9		
Barnes Co., Wallace	101	Davis & Thompson Co.	—		
Barnes, W. F. & John.	31	Detroit Harvester Company.	89		
Barnes-Gibson-Raymond	101	Direct Mail Div. Chilton Co.	111		
Bendix Aviation Corporation		Disston & Sons, Inc., Henry.	—		
Bendix Products Div.	14	Doehler & Jarvis Corporation.	99		
Eclipse Machine Div.	—	Dole Valve Co., The.	—	Hannifin Corp.	—
Stromberg-Elmira Div.	—	Donaldson Co., Inc.	—	Hanson-Whitney Company	13
Zenith Carburetor Div.	—	Dow Corning Corp.	—	Harrison Radiator Division.	29
Bendix-Westinghouse Automotive Air Brake Co.	83	Driv-Lok Pin Co.	—	Hartford Steel Ball Co., The.	82
Besly & Co. Chas. H.	110	Dunbar Brothers Co.	101	Heald Machine Co., The.	—
Bethlehem Steel Co.	105	du Pont de Nemours & Co., Inc., E. I.	—	Heli-Coil Corp.	—
Black & Decker Mfg. Co., The.	—	Dykem Co., The.	110	Herbrand Division, The Bing-ham-Herbrand Corp.	—
Blake & Johnson Co.	—	Dynamatic Corp. Div. Eaton Mfg. Co.	8	Holley Carburetor Co.	—
Blakeslee & Co., G. S.	70			Hoof Products Co.	—
Borg & Beck Div.	—	Eaton Manufacturing Co.	26-103	Hoover Ball & Bearing Co.	—
Borg-Warner Corp.	—	Elastic Stop Nut Corp.	—	Houde Engineering Div.	104
Bower Roller Bearing Co.	—	Elco Tool & Screw Corp.	—	Houghton & Co., E. F.	—
Brandt, Inc., Chas. T.	102	Electric Auto-Lite Co., The.	—	Howell Electric Motors Co.	95
Bridgeport Brass Co.	—	Electric Furnace Co., The.	—	Hyatt Bearings Div.	—
Brown Corp., The.	92	Electric Storage Battery Co.	7		
Builders Steel Supply Co.	110	Ex-Cell-O Corp.	59	Illinois Tool Works	—
Bullard Company, The.	93			Indiana Gear Works.	64
Bundy Tubing Company.	—	Fafnir Bearing Co., The.	—	Inland Manufacturing Div.	—
Bunell Machine & Tool Co.	61	Fairfield Mfg. Co.	—	Inland Steel Company	—
Burlington Mills, Inc.	—	Federal-Mogul Corp.	87	International Nickel Co., Inc.	2
		Fellows Gear Shaper Co., The.	110		
C. A. V. Division of Lucas Electrical Services, Inc.	88	Fitzgerald Mfg. Co., The.	111	Johnson Bronze Co.	—
Campbell, Wyant & Cannon Foundry Co.	—	Foote-Burt Company	—	Johnson Co., Eric S.	72-73
Carboloy Company, Inc.	—	Fram Corp.	—	Johnson Products, Inc.	—
Carnegie-Illinois Steel Corp.	—	Fuller Manufacturing Co.	—		
				Kelsey-Hayes Wheel Co.	108
				Kester Solder Co.	—

Index to

The Advertisers' Index is published of the advertising contract. Every rectly. No allowance will be made

King-Seeley Corporation	—	New Departure Div.....	—	Strom Steel Ball Co.	94
Kopp Glass, Inc.	—	Niagara Machine & Tool Wks.	—	Stuart Oil Co., Ltd., D. A.	—
Kropp Forge Company	—	Norton Company	—	Subscription Post-Card	106
				Sun Oil Company	—
				Superstrand Machine Tool Co.	80-81
Lamb Electric Company.....	—	Oakite Products, Inc.....	—	Standard Steel Corp.	—
Layne & Bowler, Inc.....	100	Ohio Crankshaft Co., The.....	85	Synchro-Start Products, Inc....	110
Leeds & Northrup Co.....	—	Ohio Division	101		
Lipe-Rollway Corp.	—	Ohio Seamless Tube Co., The ..	—		
Littelfuse, Inc.	—			Taylor Dynamometer & Machine Co.	—
Long Manufacturing Div.....	—	Page Steel & Wire Div., Amer.	—	Tennessee Coal, Iron & R. R. Co.	—
Lord Manufacturing Co.....	—	Chain & Cable Co., Inc.	—	Texas Company, The.....	4
		Palnut Company, The.....	—	Thompson-Bremer & Co.....	—
		Parker Rust Proof Co.....	28	Timken Roller Bearing Co., The	97
Magnaflux Corp.	—	Pedrick Piston Rings.....	—		
Magnecord, Inc.	96	Perfect Circle Corp.....	71		
Mahon Co., The R. C.	—	Pesco Products Div. Borg-	—	Tomkins-Johnson Company,	—

Advertisers

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for errors or failure to insert.

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Mattison Machine Works	—	Rockford Clutch Div.	—	Vickers, Inc.	—
Mechanics Universal Joint	—	Ross Gear & Tool Co.	—	Victor Manufacturing &	—
Div.	—	Rubutex Div., Great American	—	Gasket Co.	—
Michigan Steel Tube Products	—	Industries, Inc.	—	Vulcan Rubber Products, Inc.	7
Co.	—	Ryerson & Son, Inc., Joseph T.	—		
Michigan Tool Co.	—			Waldes-Kohinoor, Inc.	—
Micromatic Hone Corp.	—	SKF Industries, Inc.	—	Waukesha Motor Company	—
Midland Steel Products Co.	86	Saginaw Steering Gear Div.	—	Wean Equipment Corp.	—
Miller Motor Co.	—	Schmieg Industries, Inc.	—	Wellman Bronze & Aluminum	—
Milsec Manufacturing Co.	111	Schwitzer-Cummins Co.	55	Co., The	—
Moraine Products Div.	—	Seovill Mfg. Co.	—	Western Felt Works	10
Morse Chain Co.	—	Sealed Power Corporation	—	Wheland Company, The	—
Muskegon Motor Specialties	—	Seneca Falls Machine Co.	11	Wilkening Mfg. Co.	—
Co.	—	Service Spring Co.	—	Williams & Co., J. H.	110
Muskegon Piston Ring Co.	—	Set Screw & Mfg. Co.	—	Wisconsin Motor Corp.	—
		Shakeproof, Inc.	—	Wittek Mfg. Co.	98
N-A-X Alloy Division	—	Shore Instrument & Mfg. Co.	—	Wollensak Optical Co.	—
Nadella	—	Shuler Axle Co.	—	Worcester Stamped Metal Co.	110
Nash Bros. Company	—	Simonds Abrasive Co.	—	Wrought Washer Mfg. Co.	—
National Acme Co., The	77	Spicer Mfg. Div. Dana Corp.	63	Wyman-Gordon	—
National Broach & Machine	—	Stalwart Rubber Co., The	—		
Co.	—	Standard Oil Co. (Ind.)	—	Yale & Towne Mfg. Co., The	—
National Motor Bearing Co.	—	StéAme des Roulements a	—	Yates-American Machine Co.	—
National Steel Corporation	—	Aiguilles	—	Young Radiator Company	3
National Tube Company	—	Sterling Aluminum Products,	—		
New Britain Machine Co.	—	Inc.	57	Zollner Machine Works	—
				3rd Cover	—

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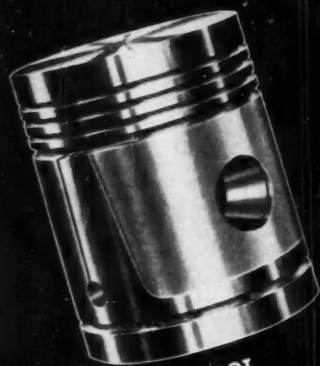
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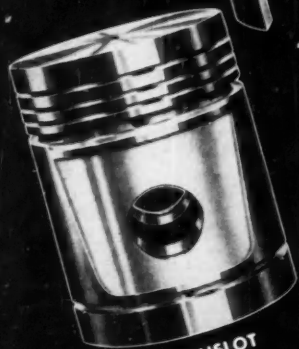
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